Essays on remittances in rural Malawi

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Award date:
2008

Awarding institution:
University of Bath

ESSAYS ON REMITTANCES IN RURAL MALAWI

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A thesis submitted for the degree of Doctor of Philosophy
in Economics

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September, 2008

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ACKNOWLEDGEMENTS

I would like to thank my supervisors, Joshy Easaw and Atanu Ghoshray for their support throughout my thesis. In addition, I would like to thank other academic and non-academic members of staff at the University of Bath who have supported me academically and personally over the last few years. In particular, James Copestake, Pete Dawson, Joe Divine, Tim Hinks, John Hudson, Susan Johnson, Ajit Mishra and Bruce Morley have all helped me to broaden and challenge my ideas, and provided guidance. Michelle Hicks, Elaine Irvine, David Ramsey and Maggie Smith have assisted me in administrative matters during my time at the University of Bath. Both my internal and external examiners, Colin Lawson and Julie Litchfield made suggestions during the viva voce which have improved the quality of this thesis.

I also owe a debt of gratitude to previous universities and lecturers. In particularly, Catia Montagna at the University of Dundee and Matthieu Crozet at the University of Paris 1 Panthéon-Sorbonne were of great inspiration during my time at these institutions and have continued to support me since.

This thesis has also benefited from insights from Willie Kachaka of the Malawian National Statistics Office in Zomba, Malawi, Susan Watkins at the Malawi Social Networks Centre at University of Pennsylvania, United States and participants at numerous seminars at the University of Bath and Chancellor College, University of Malawi.

Last but not least, I am grateful to numerous friends and colleagues with whom “intellectual” discussions have helped to stimulate ideas, resolve problems and generally “save the world” throughout the last few years. At the University of Bath, Lavanya Anneboina, Louis Boakye-Yiadom, Antonio Savoia and Harry Walton deserve thanks. Outside of Bath, thanks go to Godefroy Clair, Greg Davies (Dad), Sue Davies (Mum), Hela Gharbi, Karen Giffaut, Haris Irshad, Richard Record, Myriem Remal, Luca Ruosi, Hugo Thenint and Sylvain Zini.

SUMMARY

After discussing the Malawian context and summarising the remittance research, I focus on remittances in rural Malawi. I follow remittances from the giver's motivations through to the receiver's view of remittances and how the receiver uses them and finally to their impact as a means of moderating the effect of negative shocks on the receiving household.

Results show that parents remit to respondents for altruistic purposes, or for insurance motivations (e.g. to help out the respondent if they are sick). Respondents remit to parents for altruistic motivations and inheritance. There is strong bi-directionality in the remittance flows. Children remit to respondents as an "insurance premium", and for inheritance motivations. Altruism motivates respondents to give to their children. There is strong evidence of co-insurance between respondents and their siblings with both insurance payouts and premiums being paid. Respondents and their siblings also remit to each other for altruistic motivations.

There is strong evidence of "mental accounting" amongst both male and female headed households. Remittances exhibit a much lower MPC than salary and farming income. Male and female headed households differ in their use of income from different sources, however one result is consistent: remittances are used for education.

*Probit models indicate that households are more likely to receive remittances from **local** areas if someone in the household is sick (local remittances insure a health shock). Households that suffer from drought are more likely to receive remittances from more **distant** areas (other districts, a city, abroad). Drought has a major negative impact on consumption levels but distant remittances insure affected households who suffer from these. Local remittances, which make up most remittance flows, are unable to insure these community shocks. Only around 10 per cent of households receive remittances from outside their home district however. Remittances help to insure household consumption against health shocks, but only food consumption is insured.*

ABBREVIATIONS

2SLS	Two Stage Least Squares
ADMARC	Agricultural Development and Marketing Corporation (Malawian parastatal, similar to the old Milk Marketing Board in the UK)
CIA	Central Intelligence Agency
cdf	Cumulative Distribution Function (of a normal distribution)
CLT	Central Limit Theorem
CPS	Complementary Panel Survey
CSR	Malawian Center for Social Research
df(c)	Degrees of Freedom (Degree of Cluster Freedom)
FDI	Foreign Direct Investment
FE	Fixed Effects (Regression)
FEWS(Net)	Famine Early Warning System (Network)
FHH	Female Headed Household
FTP	Family Transfers Project
GDP	Gross Domestic Product
HIPC	Heavily Indebted Poor Country
IFPRI	International Food Policy Research Institute
IHS98	Malawian 1998 Integrated Household Survey
IRA	Individual Retirement Accounts
IV	Instrumental Variable (Regression)
LC-PIH	Life-Cycle Permanent Income Hypothesis
LDC	Less Developed Countries
LPM	Linear Probability Model
LSDV	Least Squares Dummy Variables
MBS	Malawian Migration Baseline Survey
MDHS	Malawi Demographic and Health Survey
MLE	Maximum Likelihood Estimation
MHH	Male Headed Household
MK	Malawi Kwacha (the unit of currency in Malawi)
MPC	Marginal Propensity to Consume
MSE	Micro and Small Enterprises
NSO	Malawian National Statistical Office
OLS	Ordinary Least Squares
PAE	Per Adult Equivalent
PCA	Principle Components Analysis
pdf	Probability Distribution Function (of a normal distribution)
PIH	Permanent Income Hypothesis
QUANGO	Quasi-Autonomous Non-Governmental Organisation
RBM	Reserve Bank of Malawi
RE	Random Effects (Regression)
RemDistant	Distant Remittances (from outside a household's home district)
RemLocal	Local Remittances (from a household's home village or district)
RER	Real Exchange Rate
SEM	Simultaneous Equations Model
STI	Sexually Transmitted Infections
SUR	Seemingly Unrelated Regression
UNDP	United Nations Development Programme
US$	United States Dollars
VIF	Variance Inflation Factor
WDI	World Development Indicators

1 CONTEXT AND BACKGROUND

1.1 INTRODUCTION

Remittances have become an increasingly important source of income for developing countries and their populations making the understanding of the role that they play at national and household levels an ever more relevant issue. In Malawi, remittances are a key component of both income and expenditure at the household level. They fulfil not only a social role, but also have essential economic purposes such as insuring weather shocks – vital in an agricultural economy facing increasing climactic uncertainty.

Using Malawian data, this study looks at remittances from three separate but related angles. Firstly, motivations to remit are studied in Chapter 5. In Chapter 6, the uses of remittances, and how they are viewed by the receiver is studied, and in Chapter 7, the importance of remittances as a means of insuring negative shocks is discussed. In all cases, existing work is extended in a timely and relevant way. Prior to analysing the data in chapters 5 to 7, an in-depth literature review is provided in Chapter 2, descriptive statistics and a general overview of the data are given in Chapter 3, and the empirical methodologies used are discussed in Chapter 4.

This present chapter fulfils the important role of giving background information on both remittances and the Malawian context. In doing so, it helps to situate this thesis in relation to other studies and to draw parallels with macro level studies. It gives important information regarding the Malawian economic and social context, which is relevant for the thesis. In particular, “health” is given its own section due to its importance in both social and economic terms in Malawi, as well as the links between health and several elements of this study. Chapter 5 includes health shocks as a potential motivation for remitting, and Chapter 7 focuses on the role of remittances (regardless of motivation) in insuring shocks (including health).

For similar reasons, while discussing the economic background and environment in Malawi, considerable weight is given to discussing agriculture. Agriculture is the mainstay of the Malawian economy in terms of employment, exports and contribution to GDP. In

addition, the agricultural environment is particularly relevant for this thesis, since all empirical chapters analyse rural Malawi.

1.2 BACKGROUND INFORMATION ON REMITTANCES

This thesis studies remittances on a micro (household or individual) level. In order to place the study within its wider context however, this section gives background information on remittances. Firstly the macroeconomic and international trends and impacts are summarised before focussing on the microeconomic level. This helps to draw parallels between household and international studies of remittance flows including their motivations and impacts, and helps view this thesis from a more global perspective.

1.2.1 Evolution and importance of international remittance flows

Elbadawi and Rocher (1992) *in* El-Sakka and McNabb (1999) calculate that by 1990 remittance flows had increased fivefold since 1970 to US$33.8bn. Gammeltoft (2002) compares flows of remittances, aid, FDI and other official and financial flows from the official statistics of developing countries from 1991-2000. Official remittances doubled to US$65bn between 1991 and 1999 and including estimates of unofficial flows such as those made through hawala-type systems these flows could increase to over US$100bn. Over the same period, aid fell by 16 per cent to US$41.6bn and the value of flows of FDI has increased continually. In 1991, aid was the largest single component of resource flows comprising 32 per cent, but by 1999 FDI accounted for over half of all financial flows to developing countries.

Ratha (2004) calculates that remittance receipts for developing countries were worth 1.3 per cent of their GDP or around US$72.3bn in 2004. This amounts to 42 per cent of the value of FDI in this year. He finds that remittances to least developed countries (LDCs) are larger as a share of GDP than those to middle-income countries (1.9 per cent versus 0.8 per cent). Ratha (2007) shows that 2006 remittance flows were double their 2001 levels at over US$200bn, and believes them to be greater than FDI when informal transfers are included.

Several factors have contributed to this increase with increased migration being particularly responsible. El-Sakka and NcNabb (1999) also discuss active policy by the Egyptian Government to encourage remittance inflows since the 1960s. The Pakistani Government also operates policies to encourage remittances including offering privileges

such as special lounges in airports, free insurance, exemption from certain import duties and emergency renewal of passports for those who remit over a certain amount. The Mexican Government subsidises remittances used to invest in businesses (Orozco, 2002b). In addition, improved and expanded data collection has helped to increase apparent remittance flows (De Luna Martinez, 2005).

All of these studies are however, limited by the lack of information on transfers. For example, informal and largely unrecorded transfers made through hawala/hundi[1] systems are believed to amount to a significant proportion of international remittance flows (e.g. Anarfi et al., 2000). In addition, official remittance flows are significantly under-reported since different countries collect different information. For example, some countries collect data on transfers made through the Post Office as well as banks, but others collect data only on those made through banks. Banks will often allow a customer to posess two debit cards, one of which can be sent to a remittance receiver, who is able to withdraw money directly from cash machines. The value of these flows is estimated in some places, but not in others (De Luna Martinez, 2005). Adams and Page (2005) found that sub-Saharan African countries have the highest proportion of unrecorded remittances equal to 73 per cent of recorded flows. If Malawi is typical, the true value of international remittances will be closer to two per cent of GDP rather than the one per cent currently estimated (WDI, 2006).

Despite the data limitations, a number of characteristics and impacts of international remittances can be discerned. For example, they tend to be stable or counter-cyclical (Gammeltoft, 2002), and increased in value during the 1995 Mexican crisis, the Asian currency crisis during the late 1990s and during natural disasters such as hurricanes in central America (Clarke and Wallsten, 2003) the Asian Tsunami (Ratha, 2007) and the northern Pakistani earthquake in 2005 (Savage and Harvey, 2007). Ahmed (2000) also notes a steady increase in remittances towards Somalia during conflict years. In addition, El-Sakka and McNabb (1999) find that inflation in the home country (Egypt) has a positive

[1] These systems allow the sender to enter a dealer's offices (often located in their own homes) and request that funds be sent to a recipient. S/he then pays the dealer, who then contacts another dealer close to the home of the intended recipient (usually by telephone). In rural areas, the local recipient will often be able to identify the recipient by name and deliver the funds directly to their house. Dealers keep records of flows in each direction, and any flows which are not netted out are settled through the occasional transfer of funds between dealers (in the form of cash, gold, jewellery or other means). These systems are widespread and able to function at very low cost (around 0.5 to 1% of the value of the transfer) and the low set-up costs means that the system is highly pervasive, even in remote areas.

impact on remittances concluding that senders increase flows in order to support families during times of rising price levels. Although these are measured on a macro level, these characteristics indicate that remittances are, at least in part, driven by altruism and/or insurance. In contrast to El-Sakka and McNabb (1999), Higgins, Hysenbegasi and Pozo (2004) find that inflation in a migrant's country of origin has a negative impact on remittance flows in Latin America whilst increased inflation in their host country serves to increase remittances as migrants seek to protect their purchasing power. A nominal depreciation of the receiving country's (migrant's country of origin) exchange rate increases remittances suggesting that migrants take advantage of potentially higher returns to investments. An anticipated depreciation however causes remittances to fall temporarily as they are delayed. Motivations to remit on a micro level are tested for in Chapter 5.

Amuedo-Dorantes and Pozo (2004) look at the impact of remittance receipts on the real exchange rate (RER) of 13 Latin American and Caribbean countries. They control for technical progress differentials, government spending, external terms of trade, interest rates and foreign aid and account for the endogeneity of remittances and potential endogeneity of foreign aid. They find that a doubling in the value of per capita remittances causes the RER of the receiving country to appreciate by 22 per cent, and conclude that remittances are potentially associated with the risk of "Dutch Disease". The same study finds that foreign aid does not have a significant impact on the RER, perhaps because during the period studied (1979-1998) much aid was tied to purchases from the donor country.

Risk of Dutch Disease and/or Balassa-Samuelson effects is strongly linked to the microeconomic uses of remittance income. El-Sakka and McNabb (1999) find that the income elasticity of imports from remittances is high while the price elasticity is low. This may indicate that remittances in kind (defined, in Egypt, to include only the value of imports funded directly by remittances) are predominately luxury goods. Finance may thus be diverted away from investment and towards conspicuous consumption. The uses of remittances are studied in Chapter 6.

Page and Plaza (2006) note that remittances, the extent of a country's overseas diaspora, and investment are strongly linked. In 2000, 45 per cent of the total US$41bn of inward

FDI for China came from the Chinese diaspora. Gould (1994) finds that a 10 per cent increase in immigrants to the US is associated with a 4.7 per cent increase in US exports to immigrants' country of origin. Head and Ries (1998) use a Tobit specification of an augmented gravity model to find that a 10 per cent increase in the stock of immigrants increases exports by 1-1.3 per cent and imports by 3.1-3.9 per cent.

Remittances can have an important impact on economic growth and poverty. Summarising previous literature, Chami et al. (2003) report that positive Keynesian multipliers can be identified for remittances. Short-term multipliers between 1.24 and 3.2 are reported (Adelman and Taylor, 1990; Davies and Davey, 2008).

Modelling remittances, Chami et al. (2003) measure per capita economic growth as a function of workers' remittances. Under all specifications of their theoretical model, they find a negative relationship. Their results are robust even when instrumenting to correct the problem of endogeneity; the main causes of growth might also influence remittances. They conclude that "[n]ot only do remittances in low-growth countries tend to be higher, but higher remittances within a country are associated with lower growth" (p.74).

Adams and Page (2003) look at the impact of inward remittances on poverty. They find that a 10 per cent increase in remittances as a percentage of GDP decreases the share of people living in poverty by 1.6 per cent. Furthermore, the poorest tend to be the largest beneficiaries, with the poverty gap also decreasing in remittances. This paper has the weakness of assuming that remittances are exogenous. It does not consider a household's income under the alternative situation that the remitting migrant had stayed and worked at home.

Yang and Martinez (2005) use data on household level remittance receipts in the Philippines from before and after the 1997 Asian currency crisis and find that that "an increase in the migrant households' remittances receipts equivalent to 10 per cent of pre-crisis household income reduces the poverty rate among such households by 2.8 percentage points". Additionally, they find that non-migrant households benefit from increased gifts, reduction in poverty rates and poverty gap thanks to the "trickle-down effect" of remittance income.

Gustafsson and Makonnen (1993) simulate a model to estimate the change in poverty rates in Lesotho – a country in which remittances (mostly from South African mines) made up around 40 per cent of GNP at the time studied (1986/87) – if workers were forced to return home. In their most advanced model which considers the labour of returned miners, an additional 11 to 14 per cent of households would be classified as poor.

1.2.2 Microeconomic impacts

Studies have shown that remittances can impact on consumption and savings behaviour (studied in Chapter 6) including investment in education (discussed in Chapter 6) and business, labour market behaviour, and can act as insurance for shocks (studied in Chapter 7). The impact of remittances can be determined by the motivation for sending them (studied in Chapter 5).

1.2.2.1 Consumption behaviour

In an analysis of 200 semi-urban Salvadorian households, Benavides et al. (2003) postulate that households with and without migrants will exhibit different consumption patterns. They split their sample accordingly and find that households with migrants exhibit a higher savings rate (22.5 per cent versus 3.9 per cent of income) and invest over three times more in health, education and other categories than non-migrant households. Furthermore school-age children in migrant households are more likely to be enrolled in education than those in other households. Looking at poverty, these same authors find that absolute poverty is lower for households with migrants than those without (72.5 per cent versus 94.4 per cent). However, income and expenditure in migrant households are around 50 per cent higher than in non-migrant households leaving open the question of causality.

Taylor and Mora (2006) attempt to answer the question "Does Migration Reshape Expenditure in Rural Households?". They suggest that this may occur through remittances but choose to separate their (Mexican) sample into households with a migrant and those without whilst controlling for any potential selection bias using Inverse Mill's Ratios. They find that households with international migrants dedicate a larger marginal budget share to investments than non-migrant households (0.21 compared with 0.10). Households with US migrants also spend more at the margin on consumer durables than other households (0.22 against 0.12) and more on services than non-migrant households (0.23 versus 0.16).

However, households with internal migrants exhibit a lower marginal propensity to invest than non-migrant households (0.06 compared with 0.10).

The 2006 Malawian Migration Baseline Survey (MBS) interviewed 9,546 respondents of whom 736 were migrants. It looked at the link between migration and remittances and found that remittances contributed an average of six per cent to total household income with farming produce adding an additional 31 per cent, casual labour (known as "ganyu") 27 per cent and wage employment 18 per cent. 27 per cent of households only sent (and did not receive) remittances, with the MBS report assuming this always went to a worker away from home. 15 per cent of households received remittances and 17 per cent both sent and received remittances. The findings also indicate that male migrants are more likely to remit than female migrants with two thirds of males remitting as opposed to one third of females. This is likely to be a reflection of the reasons for migrating. Men are more likely than females to migrate for employment and remit home.

Although difficult to assess due to the fungibility of assets, the MBS asked respondents about how they spend the remittances they receive. Respondents reported that remittances were primarily used to fund the purchase of food, with 75 per cent of urban households, and 46 per cent of rural households reporting using their remittance receipts to purchase food. Remittances were also important to pay for water and medical bills. These uses show that remittances are used for necessities (perhaps following a negative shock), and the medical expenditure suggests insurance or altruistic motivations for remitting.

Table 1.1: Reported Uses of Remittances by Respondents of 2006 Malawi Migration Baseline Survey

	Rural	Urban
Food	46.0%	75.0%
Water	25.6%	5.4%
Medicine	20.1%	13.4%

Source: Adapted from NSO (2006)

1.2.2.2 Education

Yang (2005) and Yang and Martinez (2005) find that increases in remittance flows in the Philippines resulting from the 1997 exchange rate shock led to improved schooling expenditure; a decrease in child labour; an increase in durable good ownership and increased investment in capital intensive entrepreneurial activity.

Cox Edwards and Ureta (2003) focus on the use of remittances for investment in education in El Salvador. They examine the effects of remittances on school dropout rates amongst families which receive remittances and those which do not. They find that the hazard of dropping out decreases by 0.4 per cent as household income increases by 100 colones, although in rural areas this impacts only after the 6th grade. The receipt of 875 colones (the median remittance) decreases the hazard of dropping out before the 6th grade by 54 per cent and by 27 per cent from the 7th to 12th grade. The impact of remittances at its smallest is 10 times the size of the effect of any other income source. The authors offer two explanations for this. Firstly they suggest that remittances are more stable than other sources of income and so offer a better proxy for permanent income than other sources of income (although, since they use cross-sectional data, they offer no proof of this in this instance). The second is that there is a higher propensity to spend on children's schooling out of remittances than out of other sources. They explain this result by suggesting that such spending is a condition of continuing to receive remittance payments. Chapter 6 focuses on MPC out of remittances and finds that remittances are indeed used to fund education. However, Chapter 6 offers an alternative explanation.

Kozel and Alderman (1990) *in* Chami et al. (2003) report that the receipt of remittances has a negative effect on the probability of labour market participation amongst male adults in Pakistani households. The full long-term impact of this is difficult to assess given that we do not know whether time was spent in education or leisure. Bokosi (2001) notes that labour is already underemployed in Malawi.

Lucas (1987) found improvements in agricultural practices due to investment from remittance income. However, he found that the associated gains were offset by the effects of labour withdrawal from agriculture towards mines. More importantly, Azam and Gubert (2004) find that the lower crop production is not simply a result of the withdrawn labour, but a behavioural (moral hazard) response to the receipt of remittances.

1.2.2.3 Business

Amuedo-Dorantes and Pozo (2006a) analyse the links between remittances and business ownership. They model remittances and entrepreneurship as being simultaneously determined since ownership of a business may influence receipt of remittances while receipt of remittances may influence entrepreneurship. They find that business

ownership raises the probability of receiving remittances (even from extended family) by 20 percentage points. However, receiving remittances lowers the probability of owning a business. They suggest that "while remittances may loosen the budget constraints faced by some households when it comes to business ownership, these monetary inflows also induce an income effect that raises the reservation wages of those household members" (p.950).

Orozco (2003) indicates that remittances tend to be saved or invested in education, health or wealth generation. Citing Woodruf and Zenteno (2001), he notes that remittances were "responsible for 27 per cent of the capital invested in micro-enterprises in Mexico". Orozco (2002) finds in a study of six developing countries plus Portugal that "at least 10 per cent of recipient households use their money for a savings or investment scheme", and Iskanda (2002) *in* Orozco (2002) states that 70 per cent of Moroccans living abroad have invested in Morocco, compared with only 30 per cent who have invested in their host countries.

Massey and Parrado (1998) use repeated cross-sectional data from 1982-83 and from 1987 to 1992 to assess the link between international remittances and business formation in Mexico. Using a probit model, they find that receipt of remittances increases the likelihood that a household will form a business and increases productive investment, although the latter was more influenced by personal, household and community characteristics than remittances or migration as such. They also find that remittances received during a household migrant's absence had little impact on business formation, but rather, following the migrants' return, remittances increased business investment. Local market conditions also play a role, with some areas being more entrepreneurial than others.

In a report based on the Micro and Small Enterprise (MSE) Survey undertaken in Malawi in 2000, Ebony Consulting International Ltd, Kadale Consultants and the National Statistics Office (2000) find that the principal source of MSE start-up capital is remittance income in around 12 to 19 per cent of cases between 1998 and 2000. Furthermore, the percentage of business start-ups using this source of income as their major start-up capital is increasing over time. This is compared with an average of two per cent which

used credit institutions, seven per cent who used loans from family or friends and 61 per cent who used personal savings.

McCormick and Wahba (2001) use a dataset of 1,526 return migrants to Egypt. They note that 10 per cent of returnees invest in economic projects. They find that 19 per cent become employers compared with 10 per cent pre-migration and one third of new entrepreneurs judged skills acquired abroad to be useful. Savings accumulated overseas were also important. Furthermore, the private sector is more favoured post migration with just nine per cent returning to public enterprises against 44 per cent before migration. The industrial pattern of employment remains similar however with a modest shift away from agriculture and production. Using a probit model to estimate the probability of becoming an entrepreneur, McCormick and Wahba (2001) find that the savings acquired abroad are most important in setting up a business for those with lower education who perhaps find it more difficult to access credit in Egypt, while overseas experience (skills gained) matters most for the better educated.

Ahmed (2000) notes that 15 per cent of remittance receivers in post-war Somaliland used their remittances to set up businesses or acquire land or housing. He also reported other main uses of remittances as being consumption, celebrations (such as marriage) and blood money (payable under Islamic sharia law in lieu of execution following a murder).

Woodruff and Zenteno (2001) use a probit model to estimate the probability of an individual being a business owner, controlling for personal characteristics. They use the migration rate of the state in which the individual is living and the state in which s/he was born as a proxy for “access to remittances”. The results are compared with Bank of Mexico remittance data and results are shown to be similar. They find that both higher migration rates and higher remittance levels are “generally associated with higher rates of enterprise ownership”, with the effect being stronger for female and internal migrants than for males and those who migrate abroad. The paper continues to estimate the log of capital invested in business enterprises (but seems not to control for potential selection bias) to find that invested capital is higher in states with more migration to the US and “a one standard deviation increase in the migration rate is associated with an increase in invested capital of about 10 per cent”.

1.2.2.4 Remittance mechanisms and the impact of technology

International remittances can be sent formally or informally. Formal remittances will tend to be in the form of cash sent through banks or money transfer agencies. Different countries count these differently. For example some include those sent through the post office and others do not. In addition, some banks allow account holders to have several cash cards. One of these can be sent abroad and the remittance receiver can withdraw a certain amount per month. Some countries make efforts to calculate the value of these 'semi-formal' remittances, whilst others do not. In this case it is difficult to know which flows are remittances and which are simply the remitter visiting family in his/her home country.

Both internal and international informal transfers are made in several ways. The remitter might save money and then carry it in cash to the recipient. Alternatively cash might be given to a friend or family member to take to the receiver. Internally, or across land borders, cash might be given to those who make a trip regularly such as bus drivers. In some areas, hindu or hawala systems are also used. Finally, the remitter might make purchases directly for the receiver. This might include paying school fees directly, or giving gifts.

Over large (or even small) distances, and where technology is not easily available, the costs of remittances can be prohibitive. It can take a day or longer to make even short journeys in rural Africa, and large firms are often unable to reach the rural poor.

The recent development of mobile phone networks which pervade even the remotest rural African areas are giving Africans access to national and international networks which can be used to transfer funds. Many phone companies allow remitters to text funds to receivers, who are then able to 'cash in' their balance at local stores. This is greatly reducing the costs of remitting to rural areas, and, although little research has been undertaken to date, this innovation has the potential to greatly reduce transaction costs. The impact of this has yet to be observed.

Finally, both governments and the World Bank[2] are making efforts to publicise the costs of sending international remittances in an effort to encourage competition amongst

[2] See: http://remittanceprices.worldbank.org/

formal money transferors and reduce costs. This has had additional impetus since 9/11 since western governments value the importance of formal remittance flows as opposed to informal finance, which can be used to finance terrorism.

1.3 THE MALAWIAN CONTEXT

1.3.1 Geography

Malawi is a small country situated in south-east Africa measuring approximately 900km from north to south and 80-150km from east to west with Lake Malawi covering approximately a fifth of its total area. It is densely populated with a population of around 13 million. Although Lake Malawi is the third largest freshwater lake in Africa, the country is landlocked and borders Tanzania to the north, Mozambique to the west, south and east and Zambia to the east. There have been recent moves to allow medium sized ocean going vessels direct access to Malawian ports through canals and rivers in Mozambique.

Figure 1-1: Map of Malawi

Source: CIA World Factbook

Malawi is a largely rural country with around 15 per cent of the population living in cities. The four main cities are Lilongwe, the capital in the centre of the country, Mzuzu in the north and Blantyre (the commercial capital) and Zomba (the former capital) in the south.

Figure 1-2: Map of southern Africa

Source: oasisafrica.com

1.3.2 History and society

The Malawian population is largely descended from several waves of migration. Bantu tribes began to migrate into the area from central Africa from around 200AD bringing with them Iron Age agricultural technologies. During the sixteenth century Maravi Bantu tribes began to settle in Malawi and the majority of modern Malawians including the Chewa who are dominant in the south and central regions and the Tumbuka who are dominant in the north are descended from this wave of migration.

During the nineteenth century Yao tribes entered the southern region from Mozambique partly displacing the Maravi from the area and Ngoni Zulus migrated northwards from South Africa, eventually settling in central and northern Malawi.

Arab slave and ivory traders, who had been active along the east coast of Africa for a millennium began moving inland during the nineteenth century bringing with them Arabic culture and Islam. Arabic influence remains strong in some areas of the south. Around the same time British missionaries and scientists were arriving in Malawi bringing with them Christianity and commerce. Modern Malawian school books look favourably upon the "achievements of the Muslims and … the Christian missionary groups" (Standard 6: p.80). Today around 80 per cent of the country is Christian of various denominations; around 15 per cent is Muslim; and 5 per cent hold traditional religious beliefs of worship of a single God through ancestors (Mkandawire, 1999: p.38; Phiri, 2004: p.29). There is little (but growing) religious tension and a majority Christian electorate elected a southern Muslim president, Bakili Muluzi, in 1994.

Although Malawi is generally a harmonious place whose people are proud to be a "peaceful nation", the country has strong regional divisions. Today these divisions manifest themselves in the religious make-up of the regions (Muslims are concentrated in the South along Arab-Swahili slave trading routes); language (Tumbuka is spoken in the North and Yao in some southern areas while Chichewa is used in most other regions); voting (political parties have strong regional biases (Mkandawire, 1999: pp.20-21)); and inheritance and marriage customs (the north is largely patrilineal and patrilocal whilst the south and centre is more matrilineal and matrilocal).

In addition, the colonial legacy has left vast disparities in education and industrial capacity. Christian missionaries tended to set up schools in the north of Malawi, while industrialists set up production facilities in the south. The result is that upon independence, 55 per cent of northern children attended school compared with around a third in the rest of the country (McCracken, 2002). Industry is concentrated in the south where the industrialists tended to settle.

Today, literacy rates are 82.1 per cent of the population for men and 70.7 per cent for women, but both literacy and school attendance are higher in the north (NSO, 2006b: p.37). Furthermore, in some northern regions, female literacy rates are higher than those of men, while the greatest gender disparities exist in the southern tip (Sena-speaking area) of Malawi with the male rate of literacy being over 22 percentage points higher than that for females. School enrolment rates amongst 6 to 13 year olds are on average 65.7 per cent but this increases to over 85 per cent in many northern areas, and falls to under 55 per cent in some southern areas. Education levels are greater on average in the north, with 7-9 years of education on average, while many areas in the south have less than 4 years of formal education. Educational achievement is higher in urban areas than rural ones, with less than 2.5 per cent of rural people achieving their Malawi High School Certificate, compared with over 10 per cent in urban areas (NSO, 1998).

1.3.2.1 Health

This section will show that health is an important issue in Malawi and can have a large impact on the both the household and the wider economy. Discussion of health is best done by classifying issues into those related to HIV/AIDS and other issues. This section provides essential information for understanding the context of the study, and also helps to justify studying health shocks in the context of motivations for remitting in Chapter 5 and remittances as insurance for health shocks in Chapter 7. An overview of Malawi's health situation and findings regarding specific issues such as malaria and malnutrition are provided. A dedicated section deals separately with HIV/AIDS.

Malawi has three central hospitals and over 40 regional ones. However these are not spread evenly with some districts not having any medical facilities (King and King, 2000). Access to these hospitals remains difficult with average walks of over 12 kilometres to reach a hospital and between 2 and 5km to reach a health centre (Conroy et al., 2006: p.105). Health care spending is around £3 per patient compared with £700 per patient in

the UK (King and King, 2000: p.19); one surgeon per one million people compared with one per 30,000 in the UK and one doctor per 30,000 compared with one per 600 in the UK (King and King, 2000: p.30). The health service relies on medical assistants and "clinical officers". Clinical officers are often confused with doctors but do not have the same level of training. This is partly a calculated move by the Government which ceases a doctor's training before doctor status is reached, ensuring staff do not migrate to developed countries.

Malawi lacks important medical staff with vacancy rates of between 42 and 87.8 per cent for positions of different grades in both government and Christian Health Association of Malawi (CHAM)[3] clinics and hospitals (Conroy et al., 2006: p.38). This remains the case despite the British Department for International Development (DfID) paying to double medical workers' salaries in 2006 and ensuring the funds are available to pay any new medical staff. "Of the 26 districts in the country, ten have no Ministry of Health doctor and four districts are without any doctors" (Conroy et al., 2006: pp.43-44).

Using Demographic and Household survey data, Devereux et al. (2006) report that around 48 per cent of children in Malawi are stunted. Furthermore, there is a strong association between child stunting and the mother's education, with incidence of stunting falling significantly after 4 years of education. The problem is most severe in urban areas (NSO, 2006b: p.12). "Malnutrition is severe in Malawi because the great majority of the population cannot afford to eat enough even in normal [crop yield] years" (Conroy et al., 2006: p.41). The average Malawian consumes 1818 calories per day, and poor households which account for 65 percent of the population consume only 1428 calories per day compared to the 2000 to 2500 calories needed to sustain the average adult male (Conroy et al., 2006: pp.39-41).

The impact of malaria is also severe for households and the national economy in Malawi. 40 per cent of outpatient visits are due to malaria and malaria accounts for 18 per cent of the deaths of under-fives (NSO, 2006b: p.17; Conroy et al., 2006: p.34). Furthermore, malaria risk is highest during the agricultural season; the time at which households have the greatest need of their labour. Malaria dramatically decreases a household's

[3] CHAM provides around 37 per cent of Malawi's healthcare (Conroy et al., 2006: p.146; The Nation, 20/10/2006).

productivity since missing key dates for planting, harvesting or weeding has a severe negative impact on crop yields. Maize yields can be between almost nothing to around 4,000kg per hectare depending upon fertiliser use and the weeding regime. The total cost of malaria to the average Malawian household is estimated to be around 22 per cent of annual household income (Conroy et al., 2006: pp.35-36 and p.90).

1.3.2.2 A focus on HIV/AIDS

Malawi has the tenth highest HIV prevalence in the world, with over half a million Malawians having died as a result of the disease and around half a million children having lost at least one parent to HIV/AIDS. AIDS has also had a strong impact on life expectancy with it having dropped to less than 39 years of age due to the disease. Without AIDS, it is estimated to have been around 56 years (Morah, 2007; Conroy et al., 2006: p.65).

Official rates of HIV are around 14-15 per cent and have remained relatively steady since the turn of the 21st century. There is also some indication that official rates are actually *over*-estimates and that prevalence has fallen in recent years with the 2004 Malawi Demographic and Health Survey (MDHS) finding an infection rate of around 12 per cent (11 per cent in rural areas and 17 per cent in urban areas) (Morah, 2007).

Morah (2007) analyses attitudes to the spread of HIV in Malawi following the discovery in a national survey conducted in 2003, that 94 per cent of the adult population agree with the proposition that "HIV is spread by people who know they are HIV-positive, but cannot or will not change their behaviour". Morah (2007) uses a sample of 743 respondents of whom 327 were openly living with HIV and 416 individuals who were unaware of their HIV status. He finds that the HIV positive have better knowledge of the disease and are more much more likely to engage in safer sexual behaviour. Although they are more likely to practice safer sex, 56.6 per cent of HIV positive people did not report *always* practicing safer sex.

Reasons for not practicing safer sex amongst those who did not know their sero-status varied but a full 12.6 per cent of those who did not know the sero-status of their partner reported not knowing where to purchase condoms or not knowing how to use them. Other reasons included fatalism: with 35.3 per cent of HIV positive and 30.7 per cent of sero-status unaware reporting that they believed that becoming infected was pre-

destined by God/Allah. 23.2 per cent of HIV-positive and 39.4 per cent of sero-status unknowns believe that “condoms have holes in them that allow the HIV to go through”.

King and King (2000) note that 80 per cent of the HIV patients under the age of thirty years were females but men predominated in the over-thirties patients with total deaths from each being equal. They conclude that inter-generational sex was responsible for this. This may be through transactional sex or through sexual cleansing rituals in which an older man known as a “fisi” or “hyena” has sex with young girls after they have gone through an initiation ceremony (Conroy et al., 2006: p.55). Such practices are being strongly discouraged through awareness campaigns and general promotion and discussion in the media (The Sunday Times, 24/10/2006; The Nation 23-29/10/2006).

Conroy et al. (2006) believe that the HIV/AIDS pandemic is fuelled by the gender inequality “because women are unable either to refuse sex or to negotiate safe sex” (Conroy et al., 2006, p.29). Females are more likely to contract HIV at a younger age than men. Just over 10 per cent of new female infections occur between the ages of 20 and 24 years, compared with 3 per cent of new male infections. Conroy et al. (2006: p.53-55) present evidence that younger women are having sex with older men. In addition, young women are more likely to contract HIV because their bodies are more physiologically vulnerable to HIV infection (Conroy et al., 2006: p.534).

In her first person account of the 2002 famine in Malawi, Anne Conroy (*in* Conroy et al., 2006: p.129) notes that “[y]oung women reported that many of them had multiple sexual partners during the food crisis in order to increase food availability for the family.” The number of patients presenting themselves with sexually transmitted infections (STI) increased by 31 per cent during the food crisis and teenage pregnancies increased by 93 per cent and abortions by 62 per cent. In addition, levels of violence increased during the crisis “as people were beaten up (sometimes fatally) when they were caught stealing food” (p.129). Lack of insurance following climatic shocks can have important social and long run economic effects through health and makes the study of remittances as insurance, as in Chapter 7, essential.

The economic and social impacts of HIV/AIDS are costly. Orphaned children represent around 13 per cent of the under-18 population (of which around half are AIDS orphans)

(Conroy et al., 2006: pp.144-145). This group are at greater risk of malnourishment and disease than other children, and the elderly are both deprived of their "pension" (in the form of help in their old age from their children) and are left to bring up young children. Decreased useful labour during the agricultural season decreases crop yields and resources are diverted to pay for health care and funerals. Experienced and knowledgeable people often die without having passed on their expertise. Households break up frequently where a member is chronically ill and husbands or wives (depending upon whether the tribe is matri- or patri-lineal) are expected to leave the village, often without their children who are cared for by distant relatives (Conroy et al., 2006: pp.76-81).

Conroy et al., (2006: pp.62-63) report that HIV is spread following migration of husbands who seek work outside of their native district. In order to supplement her income the wife will often engage in transactional sex, while husbands will pay for sex while away from the home.

AIDS has had an impact on business with 37 per cent of firms in a sample of 22,000 households and small businesses (with less than 50 employees) reporting being aware of being directly affected by the epidemic (Ebony Consulting International Ltd, Kadale Consultants and the National Statistics Office, 2000). Morah (2007), King and King (2000) and Conroy et al. (2006: p.51) report that the urban educated are at particular risk from HIV/AIDS. King and King (2000: p.77) note that "a woman whose husband attended more than eight years at school is twice as likely to be HIV-positive than a poor peasant woman". This carries a high economic cost to the country as a whole and has strong negative consequences for businesses which already find it difficult to recruit employees with relevant skills.

1.3.3 The economy

Malawi's economy grew steadily post independence, averaging three per cent per capita real growth to 1979. Like other developing countries, Malawi was hit hard by the oil price shocks of the 1970s. These, combined with a civil war in Mozambique which deprived Malawian exporters and importers of their main route to world markets and several droughts during the 1980s led the economy into difficulties. Structural Adjustments were introduced during the early 1980s but these did little to halt long term decline, with there being some criticism of the sequencing of reforms (Kherallah and Govindan, 1999;

Mkandawire, 1999: p.117). Real GDP per capita declined between 1981 and 1995 (Mkandawire, 1999: pp.6-9).

Today, Malawi is one of the least developed countries in the world. Although economic growth in per capita GDP has been reasonable in recent years (averaging 3.53 per cent over the period 2003 to 2005 (NSO, 2005)) and reaching 4.69 per cent in 2006 (WDI, 2006), its PPP per capita GDP is US$630 (WDI, 2006). It is ranked 164th out of 177 countries in the UNDP's Human Development Indicator (UNDP, 2007).

Malawi has a fast-growing population with annual population growth anticipated to be around 1.9 per cent per year until 2015. This is reflected in the age structure of the population with around 45 per cent being under the age of 15 years. The rapid population growth has caused crop land per capita to halve between 1977 and 1998, from 0.42 to 0.23 hectares per person (Devereux et al., 2006).

Over 52 per cent of the population live below the poverty line and inequality is relatively high with a Gini coefficient of 0.62 (0.45) in 1995 (1968) (Mkandawire, 1999: p.33). The country is largely rural with only around 15 per cent of the population living in urban areas (2001). This is expected to rise to 21 per cent by 2015 and compares with less than eight per cent in 1975. Malawi is thus the fastest urbanising country in the world (United Nations Human Settlement Programme, 2004).

National debt has decreased sharply in recent years following debt relief programmes such as the Heavily Indebted Poor Countries (HIPC) initiative and debt cancellation by the British Government. Debt service declined from 7.1 per cent of GDP in 1991 to 2.2 per cent in 2001 (IMF, 2000).

Malawi regularly runs current account deficits, importing more than it exports and has seen a doubling of exports and almost tripling of imports from 2002 to 2005. Malawi's main export market is South Africa followed by Zimbabwe with which a trade agreement has recently been signed[4]. Agricultural goods make up around 80 per cent of Malawian exports with tobacco being the largest component. The tobacco industry is highly

[4] See Trade Law Centre for Southern Africa (18 July, 2006): http://www.tralac.org/scripts/content.php?id=5089

concentrated with the two largest firms, Limbe Leaf and Alliance One, representing 90 per cent of all tobacco production. The importance of tobacco in industrial agricultural production is further attested to by the fact that 90 per cent of total agricultural credit is directed towards tobacco production (Imani Development, 2006). The Government is trying to alter this trade structure since tobacco is facing declining world demand and low prices.

This export structure reflects the overall economic structure with 90 per cent of the labour force working in agriculture which contributes 36 per cent towards GDP. Industry contributes another 19 per cent towards total economic activity and services contribute around 45 per cent (2007 est. CIA World Factbook; Simler, 1997). The tobacco industry grew in importance under the Banda dictatorship which tightly regulated the industry and prevented smallholders from producing and handed out licences as favours. In 1970, 22 million kilograms of tobacco was produced, rising to 130m by 1993. Tobacco exports contributed 39 per cent of export earnings in 1974 compared to 69 per cent by 1993 (van Donge, 2002).

Inflation in Malawi is high by current western standards but remains under control by an independent central bank; it varied between 23 per cent and nine per cent between 2001 and 2006 (WDI, 2006). The exchange rate policy has been one of a “managed float” since 1994. There are currently (June 2008) around 140 kwacha to the dollar (www.chartflow.com), but the value of the kwacha is steadily declining due to the higher inflation in Malawi relative to that in the United States (Reserve Bank of Malawi, 2000; Simwaka, Kisu and Mkandawire, 2006). Constant devaluation of the Malawi Kwacha (MK) has caused the relative price of imports to rise. This is particularly important with regards to agricultural fertiliser, and is especially salient given the importance of agriculture for the economy as a whole.

Table 1.2 presents selected national indicators from Malawi and other countries in the region for comparison.

Table 1.2: Selected national indicators – Malawi and surrounding countries, 2004

Series	Malawi	Kenya	Mozambique	Tanzania	South Africa	Zambia	Zimbabwe
GNI per capita, (current US$)	*160*	480	270	320	3,630	400	620
GNI per capita, PPP (current international $)	*631*	1,130	1,168	671	10,964	890	2,041
Aid per capita (current US$)	*37.8*	19.0	63.2	46.4	13.6	94.2	14.4
Foreign direct investment, net inflows (% of GDP)	*0.9*	0.3	4.0	2.3	0.3	6.2	1.3
Lending interest rate (%)	*36.8*	12.5	22.1	13.9	11.3	30.7	278.9
Real interest rate (%)	*22.7*	5.2	8.4	9.5	5.1	8.7	-15.8
Gross savings (% of GDP)	*-7.7*	13.6	6.2	8.5	14.4	12.5	3.1
Exports of goods and services (% of GDP)	*26.5*	26.2	30.0	18.6	26.6	19.8	36.1
Manufactures exports (% of merchandise exports)	*16.4*	21.1	…	20.2	57.6	10.0	28.5
Manufacturing, value added (% of GDP)	*11.4*	11.1	13.3	7.4	20.0	12.1	13.6
Mobile phone subscribers (per 1,000 people)	*17.6*	76.1	36.4	43.6	428.5	26.1	30.7
Personal computers (per 1,000 people)	*1.6*	13.2	5.8	7.4	82.2	9.8	77.3
Price basket for Internet (US$ per month)	*62.0*	45.7	50.8	117.0	33.3	32.6	23.3
Urban population (% of total)	*16.7*	40.5	36.8	36.5	57.4	36.2	35.4

Source: World Development Indicators, 2006

1.3.3.1 A focus on agriculture

Since this thesis is focused on rural areas, it is appropriate to discuss the role of agriculture and its importance to the economy as a whole.

Agriculture is a key element of the Malawian economy, contributing 35 per cent of GDP and earning 90 per cent of its export earnings (Simler, 1997). Smallholder farmers are the "breadbasket" of the economy with 84 per cent of agricultural production coming from around two million smallholder households cultivating one hectare of land or less (Conroy et al., 2006: p.24; Mkandawire, 1999: p.44). Estate farming occupies 12 per cent of arable land and produces 20 per cent of agricultural GDP with smallholders producing the remainder. Estates produce mainly tobacco, tea and sugar, the production of which earns 95 per cent of total agricultural export earnings. Maize destined for consumption accounts for two thirds of smallholder agricultural output. The sector was strongly

regulated in post-independence Malawi, and a slow liberalisation was begun in the early 1980s (Mkandawire, 1999: pp.46-49).

Major reforms carried out between 1981 and 1999 include allowing smallholders to produce cash crops for export and liberalising fertiliser and output prices. The exchange rate was also liberalised during this period having a direct impact on estate farming through export earnings and on smallholder farming which requires fertiliser inputs to be imported (Kherallah and Govindan, 1999). Kherallah and Govindan (1999) and Mkandawire (1999: p.117) believe however that the sequencing of the reforms was not optimal. For example, input subsidies were reduced without first ensuring adequate rural credit systems were in operation.

Agricultural policies have often changed unpredictably since the early 1980s. Pre-1987 fertiliser was subsidised by the parastatal Agricultural Development and Marketing Corporation (ADMARC). ADMARC was also the monopsony buyer of most agricultural produce. It funded the subsidies by buying below the market value for produce and selling at a profit with the price fixed centrally. In 1987 ADMARC's monopsony was broken and private traders were allowed. Pricing controls for all crops were abandoned in 1996 with the exception of maize which theoretically saw its price float between an upper and lower bound. ADMARC did not however have the financial power to enforce the upper and lower bounds.

Attempts to help smallholders tended to be short term and either unsuccessful or lacking in political willpower; little attention has been paid to irrigation, for example, and smallholders have seen their purchasing power eroded year on year between 1968 and 1996 as inflation increased by more than the prices they received from ADMARC for their produce (Mkandawire, 1999). This erosion of terms of trade coupled with a fast expanding population to feed increased the risk of poverty amongst smallholders.

Devereux et al. (2006) note that livestock ownership is particularly low in Malawi compared with neighbouring countries with Malawians owning around 8.9 tropical livestock units per capita compared with 24.9 in Zambia and 157.5 in Botswana. Fear of crime is cited as one of the major reasons for not owning livestock. Although crime has increased since democratisation in the mid-1990s, Malawi remains a relatively safe

country. Regardless of the reasons, this leaves Malawian households with fewer assets to help them cope during the frequent years of poor harvest, and potentially increases the importance of remittances following shocks, as studied in Chapter 7.

1.3.4 A comparison of Malawi and her neighbours

Malawi's neighbour, Zambia is the country closest to Malawi in both economic and socio-cultural terms. The two major languages spoken in Malawi – ChiChewa and ChiTumbuka – are also spoken in large parts of Zambia. The two countries exhibit similar PPP per capita GDP, and along the borders there is a large amount of formal and informal connections between the peoples.

Like Malawi, official international remittance receipts are a little under 1 per cent of GDP (World Bank, 2007a). However, internal remittances are of great importance as a survival mechanism.

Studies show that remittances behave similarly in Zambia and Malawi. For example a report prepared by the consultancy firm, Finmark, indicates that remittances tend to be seasonal, coinciding with agricultural expenditures or helping to pay for school fees. Remittances might be cash, or in kind (Finmark Trust, 2008). Cliggett (2008) confirms that remittances in Zambia tend to be small gifts and are reciprocated. She finds that remittances are a means of social networking, and are important in order to maintain relationships with those who are able to 'insure' against negative shocks.

The Finmark study found that remitters often have difficulty remitting, but that the single most popular means is bus drivers, who charge around 10 per cent of the value to transport the remittances. Around a quarter of senders reported using bus drivers to send remittances and all bus drivers interviewed reported regularly transporting remittances.
Other neighbouring countries report differing amounts of international remittances. The World Bank (2007b) estimates that official remittances received by individuals in Tanzania amount to around 0.1 per cent of GDP. Lassen and Lilleør (2008) however find that internal remittances are also of importance here with remittances acting as an inter-generational contract funding both pensions and education.

Official remittances account for just over one per cent of Mozambique GDP (World Bank, 2007c). Tschirley and Weber (1994) report that remittances are more important on a

household level in the south of Mozambique from where South African gold mines are in easier reach compared with the north.

The similarities between the remittances in Malawi and her neighbours mean that the results found in this thesis can be abstracted to a large proportion of southern Africa, making this thesis relevant not only for Malawi, but also for the wider region.

1.4 WHY STUDY REMITTANCES IN THE MALAWIAN CONTEXT?

At the household level, remittances make up an important part of Malawian income. Between a quarter and a third of households receive remittances (IHS98, CPS) and Chipeta and Kachaka (2005) estimate that remittances account for 6.3 per cent of total household income in Malawi. Data used in this thesis indicate that for households that receive them, remittances account for around half of non-business income (IHS98). In addition, nearly one third of all rural households send remittances (CPS).

Official international remittances are estimated to be around one per cent of Malawian GDP (WDI, 2006), and the survey data used in this thesis indicate that only around one per cent of households receive remittances from abroad (CPS). However, the average value of foreign remittances is around three times the average value of those that are received from Malawian cities (CPS).

Given the share of remittances in total income, it is interesting and important to ask how this source of income impacts on consumption habits, as is done in Chapter 6. In addition, since a large proportion of remittances are local, using suitable data, it is possible to analyse the motivation behind remitting in the first place, as is done in Chapter 5.

As well as comprising an important source of income for Malawian households, remittances fulfil essential economic roles. The lack of capital markets including formal insurance in rural areas makes remittances a key component in financing cyclical agricultural production (Rapoport and Docquier, 2006; Bokasi, 2001). The contribution of agriculture to the Malawian economy as discussed in the previous section makes remittances all the more important.

Income is highly volatile on a microeconomic level due to the agricultural nature of the economy. Income is highly dependent on weather patterns, and without insurance whole

regions can be devastated economically (Davies and Davey, 2008). This makes access to both credit and insurance, often in the form of remittances, important (Rapoport and Docquier, 2006).

Finally, depending upon the motivation for remitting, remittances can help to moderate the impact of household shocks such as sickness. Health shocks such as malaria generally occur during the agricultural season during which being unable to work impacts heavily on agricultural output (Conroy et al., 2005).

The importance of remittances to rural Malawi cannot be underestimated. They are potentially capable of impacting on household consumption habits, and they fulfil the essential economic role of moderating shocks at both household and community levels. These characteristics combined with their importance in terms of the number of households that receive them and their share in household income serve to make Malawi an ideal context for the study of remittances from several perspectives.

1.5 OBJECTIVES OF THE STUDY

Given the importance of remittances in the context, this study seeks to contribute to the understanding of this income source both within rural Malawi and in general. In particular, what motivates remittances? How do they impact on consumption habits? And how do they help to moderate the impact of negative shocks? Thus, this thesis aims to contribute to the literature by studying remittance flows in rural Malawi from the initial establishment of motivations to remit, to how remittances are viewed by the receivers and their general impact on household consumption habits, and finally by studying a specific effect – insurance. Thus, in some sense, remittances are followed from the giver, to the receiver, and finally to understanding one of the major impacts.

The main objectives of the study are of interest in themselves but are also linked. The motivation for remitting can have an effect on the impact of the remittances. So, for example, remittances sent for altruistic purposes might be more likely to have a negative moral hazard effect, perhaps reducing work effort, or increasing conspicuous consumption, while remittances sent for investment are potentially more likely to be invested in useful production. Similarly, how remittances are used is likely to depend on how they are viewed by the receiver. Are remittances seen as a right or a privilege, or alternatively, are they viewed as the product of someone else's hard work, or as manna

from heaven? Finally, both the motivation for remitting and how remittances are used will have an effect on the overall impact. Altruistic and insurance motivations are more likely to moderate the impact of a negative shock, whilst investment motivations will not. Remittances used to fund education or invest in business will have a long run positive impact for the family and the economy as a whole, whilst remittances used to fund conspicuous consumption are likely to have little long run benefit for the receiving family, and may be harmful for the economy as a whole.

This thesis aims therefore to study each of these three important aspects of remittances within a suitable and relevant context. Each study can be read independently as a part of the overall story.

1.6 OUTLINE OF THE STUDY

This chapter has given relevant background information regarding the context of this study. This chapter has discussed health, which is an important part of two of the three empirical chapters (Chapters 5 and 7) and the agricultural context. In addition, this chapter has discussed remittances in general in order to help place this study within its wider context and to draw parallels between this micro study and relevant micro and macroeconomic studies.

Chapter 2 is a literature review which focuses in more detail on aspects of the literature relevant to the main empirical chapters. It is divided into a theoretical section, and three sections which review in turn the literature on (i) motivations to remit, (ii) remittances and mental accounting, drawing on the relevant psychological literature and (iii) remittances as insurance.

Chapter 3 discusses the data sets used for each empirical chapter. Since different data are used for each chapter, the context and descriptive statistics are given separately. In addition, each data set collected unique information which can be used to help inform the overall study. This thesis therefore uses the different data to focus in turn on individual transfer behaviour; differences between male and female headed households (who represent around one fifth of all households in rural Malawi); and differences between remittance receiving households, remittance sending households and those which do not engage in remittance transfers. Where possible to do so, differences between the data sets are noted.

Chapter 4 focuses on the empirical methodology. Here, the thesis discusses in turn OLS and corrections made; probit models; consumption functions and Tobit models; and panel data analysis.

Chapters 5 to 7 are the three main empirical chapters. Chapter 5 begins with studying motivations to remit and, due to data availability, focuses on intra-family (but inter-household) remittance flows. This chapter analyses separately remittance flows between respondents and their parents; respondents and their children; and respondents and their siblings. Although it should be noted that one motivation does not necessarily preclude another (for example a threat of disinheritance may motivate a child to insure a parent's health), there is evidence that different motivations drive each transfer relationship.

Chapter 6 draws on psychological theory to help understand how remittances are viewed by receivers. In particular Chapter 6 tests whether psychological "mental accounting" systems are in operation in which remittance income is used differently to income from other sources. It goes on to estimate consumption functions to analyse how remittance income is used.

Chapter 7 focuses on the impact of remittances. In particular, Chapter 7 aims to understand whether remittances help to moderate the impact of a shock. It focuses separately on idiosyncratic (household) shocks, such as death and sickness, and covariant (community) shocks such as droughts. The evidence shows that idiosyncratic shocks can be "insured" through remittances from local areas, whilst community shocks require remittances from further afield (for example from abroad or Malawian cities) which few households benefit from.

Chapter 8 summarises and concludes.

2 LITERATURE REVIEW

2.1 INTRODUCTION

The literature on remittances is wide ranging, and a summary of the related literature is provided as a background in Chapter 1. This chapter is highly focused on the literature which is directly linked to the empirical work in Chapters 5 to 7.

Section 2.2 draws on remittance theory to help situate each empirical chapter in its "theoretical context". Section 2.3 discusses microeconomic studies analysing motivations to remit. The focus is on key empirical results and the methods (particularly the discriminating hypotheses) used to obtain and interpret the results. Section 2.4 draws strongly on the economic psychology literature on "mental accounting" and shows how this can be used to study remittances. Section 2.5 reviews the theory used to study ex post coping strategies and consumption insurance in developing countries before going on to discuss the main empirical findings. Each section is therefore related to a particular empirical chapter.

2.2 THE THEORY OF REMITTANCES

2.2.1 Summary

This section provides an overall look at remittances in theory. It draws on a wide-ranging literature review by Rapoport and Docquier (2006), but focuses on areas most relevant to the thesis. Relevant theories of remittances are elucidated and links between the various theories are shown. All theories have an important element of motivation to remit behind them, but they can also be used to illustrate remittances as insurance as well as remittances as payment for services and repayment of past funding. This thesis is empirical in nature and the aim here is to provide an overview of the relevant theory rather than a detailed exposition.

Theoretical models can be split into two main branches: those modelling altruistic behaviour in which the utility of the sender (usually a migrant) depends partly on the utility of the receiver (usually his/her family at home). Poirine (2006) models altruistic remittances by a growing overseas diaspora to assess how altruistic remittance flows

should change over time. His simulations show that as the number of migrants increase, remittances per migrant decreases but total remittance flows increase. As the income gap between the host and migrant-sending countries declines, remittance flows decrease. The second branch models can be described as "self-interested". Remittances are used, at least in part, in the interest of the remitter. These models are not necessarily mutually exclusive; the existence of one motivation does not necessarily exclude another.

Self-interested models can be split into further sub-categories. The first category suggests remittances form part of a "joint optimisation" agreement where both the sender and receiver gain from risk-sharing. Different shared income sources permit the reduction of income risk from both macro and micro shocks. These models may also be called "insurance" models (Agarwal and Horowitz, 2002). The second category models families/friends as banks. Remittances are then seen as repayments of implicit loans used to fund migration or education – that is repayments from past investments. The "repaid" money is often then used to help others, often family members (Ilahi and Jafferey, 1999). Finally self-interested models might imply investment for the future rather than repayments for past investments. In this case the remitter chooses how to divide his assets amongst different geographical areas – for example the city and the countryside, or the country of origin and the host country. Macroeconomic variables would have a strong influence on remittances in this case.

These different motivations to remit imply different effects. Altruistic motivations may act as a counter-cyclical measure helping to reduce risk of poverty during recessions or other negative shocks (such as changing weather conditions). Altruistic motivations combined with asymmetric information may have the effect of reducing labour-market participation which could reduce welfare (Lucas, 1987; Azam and Gubert, 2004). Altruistic and "family as bank" motivations to remit could increase consumption at a micro level but have negative "Dutch disease" effects at the macro level. Insurance motivations serve to reduce income risk for the family, perhaps encouraging greater risk taking (perhaps investment) and increasing welfare. Finally, investment motivations suggest that remittances can help to improve output and productivity with the caveat that investment in existing housing and land stock may encourage a Balassa-Samuelson effect with negative macro consequences. All reasons to remit can have an impact on the exchange-

rate if remittances are from abroad, perhaps harming the receiving country's ability to export (Amuedo-Dorantes and Pozo, 2004).

The peculiarities of remittances suggest that their receipt may impact differently on a household's spending habits than income from different sources. Households may conform to "mental accounting models" and not spend out of remittances in the same way as they spend out of income from other sources (Shefrin and Thaler, 1988). The reason the remittance is made will impact on spending decisions and may influence other household behaviour such as labour-market participation.

2.2.2 Modelling altruism

Altruistic theories of remittances model the utility of the sender (usually considered to be a migrant family member) as a function of his or her own consumption and the consumption of the receiver household (usually the migrant's home household). Rapoport and Docquier (2006) illustrate an altruistic theory in which both the sender (s) and the receiver (r) exhibit altruism towards each other and in which the utility of the sender, $U^s(C^s, C^r)$ is a weighted average of his/her felicity derived from his/her own consumption, $V^s(C^s)$ and the utility of the receiver, $U^r(C^r, C^s)$.

$$U^s(C^s, C^r) = (1-\beta^s)V^s(C^s) + \beta^s U^r(C^r, C^s) \quad \textbf{(2.1)}$$

$$U^r(C^r, C^s) = (1-\beta^r)V^r(C^r) + \beta^r U^s(C^s, C^r) \quad \textbf{(2.2)}$$

where felicity exhibits diminishing marginal return in consumption, V′>0 and V′′<0 and the $0 \le \beta^i \le 1/2$ giving the degree of altruism. If $\beta^s = 1/2$ then the sender values the receiver's happiness resulting from consumption as much as he values his own. Values above ½ in which the sender values the receiver's happiness above his/her own are excluded[5], and a value of $\beta^s = 0$ results in a purely selfish model in which the sender (usually a family migrant) does not consider the utility of his/her family at all.

Rapoport and Docquier (2006) incorporate transfers by re-writing consumption as equal to income, I, less transfers, T. In addition, they rule out the possibility of negative

[5] Although it could be noted that this is not necessarily the case. For example, parents or grandparents might favour feeding their children or grandchildren above themselves during periods of severe food shortage.

transfers from the sender to the receiver, and impose a felicity function satisfying V'>0 and V''<0, V(.)=ln(.) and solve for the optimal level of transfers from the sender's perspective. Although not shown in Rapoport and Docquier (2006), all calculations are provided in the appendix to this chapter, and the resulting altruistic model has several properties:

(1) Transfers are increasing in the sender's income;
(2) Transfers are falling in the receiver's income;
(3) Transfers are increasing in the sender's degree of altruism;
(4) Transfers are falling in the degree of altruism of the receiving household.

This provides several testable hypotheses, but these results could also be generated by other factors. Rapoport and Docquier (2006: p.12) note that the "main testable implication of the altruistic model is that transfers cannot increase with the recipient's income".

2.2.3 Modelling insurance

Agarwal and Horowitz (2002) formally model a suggestion by Funkhouser (1995) that under altruism, remittances from any one remitter (a migrant in their model) should decline in the number of remitters (migrants), but this should not be the case under an insurance hypothesis. This provides an additional testable implication and helps to illustrate the theoretical links between the models on which elements of Chapter 5 (motivations for remitting) and Chapter 7 (remittances as insurance) are based. It is to Agarwal and Horowitz (2002) that this chapter now turns.

In a two period model, a remittance sender faces certain income in period 1, equal to I^s. In period 2, s/he faces uncertainty with high income, I_G^s, with a probability of $1-\pi$ and low income, I_B^s with a probability π $(0<\pi<1)$. S/he can choose to remit to a receiver an amount T in the first period and receive an actuarially fair indemnity ($s=T/\pi$) in the case of a negative shock in the second period. The receiver (insurer) is assumed to face no uncertainty. Denoting, as before $V^s(C^s)$ and $V^r(C^r)$ the sender's, s, and receiver's, r, felicity functions, the sender's expected utility (EU) is denoted:

$$EU = V^s(I^s - T) + (1-\pi)V^s(I_G^s) + \pi V^s(I_B^s + s) \qquad \textbf{(2.3)}$$

where felicity functions are kept constant across time and state and the sender's utility depends only on his/her own consumption, and not that of the receiver, unlike in the altruistic model.

Using log utility as before, which satisfies decreasing marginal utility to consumption and risk aversion, the optimal level of transfers or remittances, T* is shown (see the appendix to this chapter) to be:

$$\frac{\pi}{(1+\pi)}[I^s - I_B^s] = T^* \qquad \textbf{(2.4)}$$

This insurance model has several properties:

(1) Transfers are increasing in the sender's first period income (as with the previous altruistic model);
(2) Transfers are decreasing in the sender's bad state income;
(3) Transfers are increasing in the probability of a bad state (potentially proxied empirically by education, unemployment or legal status if abroad).

Agarwal and Horowitz (2002) go on to extend the altruistic model sketched above to include the fact that households receive remittances from several senders (migrants). The model provides one further testable implication: "[u]nder pure insurance (or other self-interest) motives, the number of other migrants would not affect own-remittances. On the other hand, under altruism where migrants are concerned with the welfare of the non-migrating household, the presence of multiple remitting migrants will affect the average remittance level" (p.2036). Rapoport and Docquier (2006) point out that this assumes the exogeneity of the number of remitters a household benefits from (those with more volatile income or those that are more risk averse may ensure they have more transfer relationships). In addition, they note that if household income is affected by moral hazard then household income might not necessarily be assumed exogenous. Moral hazard and remittances are modelled by Azam and Gubert (2002).

2.2.4 Payment for service

Remittances as payment for services is modelled in detail by Cox (1987) and discussed in brief by Rapoport and Docquier (2006). Here, the methodology and the central conclusions are briefly discussed.

Services transferred might include looking after the remitter's house, business, cattle (as in Lucas and Stark, 1985) or children (as in Chapter 5 of this thesis). If remittances are viewed as payments for looking after an asset, Rapoport and Docquier (2006) suggest that this is a sign of temporary migration. Alternatively, remittances can be viewed as a means of exchange in an environment in which, "due to market imperfections, transaction costs may be saved on through non-market interpersonal agreements" (p.13). The benefit from not using the market is then split between the sender (who pays less than the market price) and the receiver (who receives more than they would have by selling their labour in the market).

Rapoport and Docquier (2006) describe a reduced version of Cox (1987) in which non altruistic remittance receivers gain utility from their own income, the transfer they receive (which together form consumption) and lose utility from the service, S they provide. Using previous notation:

$$V^r(I^r + T, S) \text{ and } V^s(I^s - T, S) \quad \textbf{(2.5)}$$

The remittance sender gains from the service provided but at an ever decreasing rate, whilst the receiver who offers the services suffers from providing that service at an ever increasing rate (increasing disutility of effort):

$$\frac{\partial V^r}{\partial S} < 0, \frac{\partial^2 V^r}{\partial S^2} > 0 \text{ and } \frac{\partial V^s}{\partial S} > 0, \frac{\partial^2 V^s}{\partial S^2} < 0 \quad \textbf{(2.6)}$$

Finally, in order to provide the service to the sender, the receiver must gain at least as much total utility when providing the service than when not providing it. Allowing the remittance sender to pay the minimum amount whilst ensuring the receiver provides the service, yields one key but unsurprising result: the amount of remittances increases with the amount of service provided.

Laferrère and Wolff (2006) discuss all major models noted above taking the same perspective taken in Chapter 5; that of intra-family transfers. The main conclusions remain unchanged.

2.2.5 Mental accounting links

Mental accounting theory implies that income from different sources is seen and used differently. Thus all income is not pooled as conventional theory would imply and remittances may be used for different purposes to other income.

The motivation for remitting might influence which "mental account" this income falls into. For example, remittances from an altruistic son may be used differently to remittances given on the implicit understanding that they are payment for a service, or as an insurance premium. In addition, the fact that remittances may serve to reduce risk may have a wider impact on household consumption behaviour. Understanding motivation for remitting therefore gives an insight into the likely uses of the remittances.

Although the data used in Chapter 6 do not permit the study to assess effectively the motivation for remitting and only the *uses* of remittances are estimated, this link should be borne in mind.

2.3 MOTIVATIONS FOR REMITTING

Studies analysing motivations to remit use either Tobit models to estimate the value of remittances, probit models to estimate the probability of sending or receiving remittances or OLS to estimate net remittances received. The independent variables focus on the receiver's and sender's characteristics. Regressions thus take the form:

Remittances=f(Receiver characteristics; Sender characteristics; X) **(2.7)**

where 'Remittances' is the value of remittances sent or received (Tobit), net remittances (OLS), or whether or not remittances were received (probit) and f(.) is the relevant function (Tobit, OLS, probit). The X represents any other study specific variables included. This section focuses on discriminating hypotheses and empirical results found in the literature. Chapter 4 discusses in more detail the econometric methods used in this thesis.

Most authors are unable to rule out a variety of motivations and key conclusions are presented in Table 2.1 below.

Table 2.1: Summary of key findings from studies on motivations to remit

Study	Key conclusions
Lucas and Stark (1985) - Botswana	Positive association between remittance receipts from children and per capita household income (altruism). Sons remit more the wealthier is the household (inheritance).
Ilahi and Jafarey (1999) - Pakistan	Return Pakistani migrants remit less to their immediate family, the more they have borrowed from extended family (repayment of past loans).
Agarwal and Horowitz (2002) - Guyana	The more migrants in the household, the less a migrant will remit (altruism). Lower household income is associated with higher remittance receipts (altruism).
Naufal (2008) - Nicaragua	As the number of migrants increase, remittances from any one sender decline (altruism). As income risk of the household increases, remittances increase (altruism).
Amuedo-Dorantes and Pozo (2006) - Mexico/United States	Mexican migrants in the U.S. remit more home to Mexico as their income risk increases (insurance). Larger home households increase remittances (altruism).
De la Brière et al. (2002) - Dominican Sierra	Remittances are increasing in work day losses due to sickness for the home household (altruism, insurance, reverse causality?). Remittances are increasing in inheritable land, but decreasing in the number of heirs (inheritance).
Van Dalen et al. (2004) - Morocco, Egypt and Turkey	Higher remittances as home households perceives its financial situation to be 'insufficient' (altruism).
VanWey (2004) - Thailand	Male migrants more likely to remit to landless households (altruism) and both male and female migrants remit less as the number of migrants in the household increases (altruism). Female migrants remit less the more land the household owns (altruism).
Grigorian and Melkonyan (2008) - Armenia	High unemployment discourages remittance flows to a region (undefined selfish motives).

Untangling motivations for remitting requires finding discriminating hypotheses. Lucas and Stark (1985) test motivations to remit in Botswana. They note that children's aspirations to inherit will cause remittances to increase in the home household's wealth. By contrast a negative relationship between wealth and remittance receipts would be consistent with either altruistic or co-insurance motives. Discriminating between insurance and altruistic motivations is difficult, but the authors used data collected during a period in which Botswana suffered from a severe drought. Households with drought-sensitive assets should receive more remittances than other households. The authors note that although this is consistent with the co-insurance hypothesis, this might equally occur as a result of remitters seeking to protect inheritance.

Lucas and Stark (1985: p.910) find a positive association between remittances and per capita income of the home household. This result is consistent with inheritance motivations for remitting to parents. The authors caution however that in a "dynamic setting, one cannot rule out the possibility that past remittances sent with altruistic intent, have helped to raise today's income". They are unable to investigate this further using their cross-sectional data.

Further investigation of the inheritance hypothesis shows that sons (who are more likely to inherit than other relations) remit more to families with larger cattle herds (the main store of wealth in Botswana). This evidence of an inheritance motive is tempered with the observation that often (migrated) sons keep their own cattle with those of their household of origin. Remittances may therefore actually be contributions towards the cost of keeping the cattle (payment for service).

Finally, the authors find that households whose assets are more susceptible to drought are more likely to have higher remittances (the period of the survey included widespread and severe drought). They interpret this as evidence of a co-insurance motive, however, it should be noted that in light of the information that sons often keep their cattle with those of the household, this might also be a reflection of sons' desire to safeguard their own assets.

Ilahi and Jafarey (1999) investigate the hypothesis that remittances are, at least in part, repayment of implicit loans used by migrants to fund the initial costs of migration (transport, visa, job search, perhaps education). Using data collected from Pakistani return migrants, they know who funded the migrant and the value of remittances sent back to immediate family and savings. They use a model to simultaneously estimate remittances to the immediate family, retained savings and the size of the initial loan. They show that as the value of any loan from *extended* family increases, or the proportion of the total cost covered by such loans increases, remittances sent to the immediate family and retained savings falls. Thus, the greater the implicit loan, the more migrants are required to repay extended family, and the less money is available to save or to remit to the immediate family.

The results indicate that a 1 per cent increase in the value of the loan from the extended family decreases remittances sent to the immediate family by around 1 per cent. In addition, a 1 per cent rise in the value of a loan lowers retained savings by around 0.5 per cent. These results offer support to the hypothesis that remittances are, at least in part, repayment of implicit loans taken out by the migrant to fund the initial costs of migration, potentially including education.

Agarwal and Horowitz (2002) test insurance motivations to remit against altruistic motivations using Guyanese data. Theirs is the first paper that develops a model in which the number of migrants sent by a household is key in discriminating between altruistic and insurance motivations. They note that flows of remittances from migrants who remit for insurance reasons would not be influenced by the number of migrants sending remittances. Risk averse migrants would individually choose to be fully insured by their household of origin. Under altruistic motivations however, an increased number of (remitting) migrants would cause remittances from any one of these to decrease.

Agarwal and Horowitz (2002) model the decision to remit using a probit model. The Inverse Mills Ratio is then placed in a second stage regression à la Heckman (1976) which models the value of remittances. Since there is information on the number of migrants and the amount of remittances received in total but not which migrant remitted, the authors assume that each migrant remitted an equal share of total remittances.

A variable indicating the presence of other migrants in the household is negative and significant suggesting that remitters do indeed decrease their remittances in response to other migrants. This is consistent with altruism motivations. Household per capita income is negative and significant. That is, lower household income is associated with higher remittance receipts. This finding is again consistent with altruistic motivations.

Naufal (2008) uses Nicaraguan data to investigate the relationship between value of remittances received and (a) number of migrants from a household and (b) probability of a "bad income state" in the household. Probability of a bad income state is proxied using two measures: firstly whether the household head reported leaving work due to liquidation of the enterprise, being fired, seasonal work, lack of work, personal duties,

lack of safety at work, harassment in work and illness and secondly whether the head has been looking for work for longer than one year.

Since the value of remittances is truncated at zero, Naufal (2008) uses a Tobit model to estimate remittances received by the household from the migrant. He includes migrants' characteristics (age, gender, education, destination [developed or developing country], years living abroad and labour force status) and similar characteristics for the home household.

The data give the amount of remittances received by a household and the number of migrants, but not which migrant remitted; he therefore excludes households with more than one migrant, and controls for selectivity bias. Results from Tobit models are similar to those of probit and OLS models and indicate that as the number of migrants increase, remittance receipts decline. This is consistent with altruistic motivations. In addition, as income risk increases (as proxied by having been made redundant or been looking for work for over a year), remittance receipts increase. This result is also interpreted in favour of altruistic models of remittances, but is also consistent with insurance motivations.

Amuedo-Dorantes and Pozo (2006) test insurance against altruistic motivations to remit using data from Mexican migrants returning to Mexico from the United States. They show that risk averse migrants will be more likely to remit if they face greater risk in the host country (the United States). Income risk is proxied with legal status, access to migrant networks and American work experience amongst other variables. By contrast, the authors suggest that amount of remittances sent for altruistic purposes should not vary with income risk in the host country.

Using a Tobit model, Amuedo-Dorantes and Pozo (2006) find that the probability of remitting increases by 6 percentage points for undocumented migrants compared to documented migrants. Undocumented migrants also remit around 4 percentage points more than legal migrants. In addition, increased work experience and access to migrant social networks decrease both the likelihood of remitting and the amount remitted. These results suggest that increased risk in the host country increases the amount of

remittances sent back home. There is therefore considerable evidence in favour of the insurance hypothesis.

Amuedo-Dorantes and Pozo (2006: p.243) note however, that an insurance motive does not preclude altruistic motivations and indeed interpret a positive and significant coefficient on household size in the home country as evidence of some degree of altruistic remittance flows: “Each additional family member left back home raises the likelihood of remitting and the fraction of earnings sent home by those remitting, suggesting that the needs of the family back home are important to migrants and that migrants behave in an altruistic manner”.

De la Brière et al. (2002) compare results from four regressions (OLS, Random Effects, Tobit and Powell’s Censored Least Absolute Deviations) to study the role of destination, gender and household composition in the motivations for sending remittances in the Dominican Sierra. They discriminate between insurance and investment motivations (where investment is largely an inheritance motive) for remitting. They find evidence of both insurance and inheritance motivations. Remittances increase as the home household loses more work days to sickness suggesting that remittances insure sickness. It should be noted however that the causality may run the other way as in Azam and Gubert (2004) who find that due to moral hazard problems, remittances have a negative impact on the probability of participating in the labour market. Remittances are increasing in inheritable land but decreasing in the number of heirs indicating an inheritance motive.

Van Dalen et al. (2005) use probit models to study the probability of receiving remittances based on home household and migrant characteristics in Morocco, Egypt and Turkey. They find that households which perceive their financial situation to be “insufficient” are more likely to receive remittances than other households, suggesting altruistic motives for remitting. Well-educated migrants are less likely to send remittances than their less-educated counterparts. The authors suggest that this may be because the better educated are more likely to see their move as permanent and are therefore less likely to remit. This is consistent with selfish motivations for remitting; that is, remittances ensure a place in the household or community upon return.

A household wealth index is consistently insignificant in both the pooled sample and across countries. Under altruistic motives there should be a negative coefficient on this variable (migrants are more likely to remit to poorer households) whilst the inheritance model suggests that there should be a positive relationship between the two variables (as wealth increases, household bargaining power increases vis-à-vis the migrant, who is required to remit more in order to safeguard his/her share of inheritance). The lack of support for either the altruistic or inheritance model from this variable is interpreted in favour of the insurance hypothesis.

Although Van Dalen et al. (2005: p.23) are unable to "clearly pinpoint altruistic or motives of self-interest as sole driving forces behind the receipt of remittances", they do note that that the "characteristics of emigrants are far more important than the characteristics of migrant-sending households [in explaining remittances]". Using the criterion that household characteristics should be important in determining altruistic motivations, but not selfish ones (as Agarwal and Horowitz (2002) suggest) would mitigate in favour of self-interested motives.

VanWey (2004) uses logit models to study the likelihood of male and female migrants remitting to their household of origin, and the likelihood of the household remitting to the migrants. She contrasts altruistic and contractual remittances in Thailand and finds that male migrants are more likely to remit to landless households and both male and females are less likely to remit as the number of migrants increase. In addition remittances from female migrants are falling in land owned by the household. These findings favour the altruism hypothesis.

VanWey (2004) also analyses remittance flows from the household to the migrant and finds that migrant education has a positive impact of such remittance flows. In addition, unemployed migrants are less likely to receive remittances. Since better educated, employed migrants are likely to earn more and therefore be better insurers, VanWey (2004) notes that this is evidence of a contractual motive. Given her findings, VanWay (2004: p.748) concludes that there is "considerable support for both the altruistic and the contractual approaches".

Grigorian and Melkonyan (2008) use the 2004 Armenian Integrated Living Standards Measurement Survey to study migration and remittances in that country. They model decision to migrate and decision to remit simultaneously with household decision to work, save and spend on education. They find that high unemployment discourages remittance flows and interpret this as being in favour of the self-interest motivations.

Despite efforts to disentangle motivations behind remittance flows, it is important to note that motivations are not mutually exclusive. For example, it could be that a threat to disinherit a child encourages an insurance payout to be made. Given this, it is not surprising that most studies have difficulties in concluding unambiguously in favour of a single motivation. Chapter 5 aims to shed further light on remittance motivations by comparing and contrasting evidence of different remittance motivations according to familial relationship between the sender and the receiver.

2.4 MENTAL ACCOUNTING AND HOW IT RELATES TO REMITTANCES

Since the mental accounting hypothesis has yet to be tested quantitatively for developing countries, this literature review focuses on the theoretical framework, and summarises conclusions drawn from studies in developed countries. Where relevant, it is also pointed out why this is a suitable framework to study the impact of remittances on household consumption behaviour.

Recent empirical work has shown that remittances have a unique impact on a household's expenditure decisions. Adams (2002) finds that the marginal propensity to save out of remittances in Pakistan is higher than for other sources of income. Maitra and Ray (2002) study expenditure shares in South Africa and conclude that remittances increase the proportion of household expenditure spent on food, education and clothing. Cox Edwards and Ureta (2003) examine the impact of remittances on household schooling decisions in El Salvador. They find that remittances decrease the probability that children will drop out of school and the impact of remittances is significantly more important than for other sources of income.

One potential explanation for these impacts lies in how people view and use money from different sources. Remittances lend themselves to an analysis in such a mental accounting framework. In some cases they come with conditions attached ("use this money to educate my little brother"), in other cases they are used as a form of income pooling, mutually reducing risk (e.g. Dercon et al., 2005; Harrower and Hoddinott, 2005) and helping to smooth consumption[6] thereby potentially altering consumption behaviour. Remittances may thus be used for or encourage investment in "useful" areas such as education, health, nutrition and savings, or may be seen as "manna from heaven" and encourage non-productive behaviour (Kozel and Alderman, 1990 in Chami et al., 2005).

Mental accounting is important for government policy as well as for NGOs and banks trying to mobilise savings and encourage borrowing. If lack of consumption out of illiquid assets is a choice and not forced upon individuals, microfinance institutions not only need to provide liquidity, but also need to change consumption and savings behaviour. It is important to understand whether remittances are combined with other sources of income or spent in a particular way. If they are used for different purposes to money from

[6] Alderman and Paxson (1992) summarise the literature on risk and consumption in developing countries.

other sources, do these purposes tend to be constructive (such as education) or destructive (conspicuous consumption)?

Levin (1998) uses American longitudinal data to find marginal propensities to consume (MPC) for different categories of goods out of different assets. He finds that the MPC out of current income is around 0.42 whereas the MPC out of changes in housing value is zero. This is a common empirical result which is seen as an anomaly of the lifecycle consumption model. Credit market constraints are often cited as an explanation (Hayashi, 1987; Zeldes, 1989), but Levin suggests that individuals are not credit constrained but rather *choose* not to consume out of these assets. He uses testable differences between the models which allow him to discriminate between lifecycle consumption models with liquidity constraints and behavioural models of consumption and finds evidence in favour of the latter. Furthermore households use different wealth categories to purchase different goods; for example, they are more likely to use liquid wealth such as savings than current income to pay for occasional purchases such as vacations. Although Levin's findings support the fact that individuals choose and are not forced to consume differently out of assets with different levels of "temptation", he does not break down current income into different categories. Thus, he is unable to test whether equally liquid income is used for different purposes.

Adams (2002) uses panel data from a sample of 469 rural Pakistani households to measure marginal propensities to save and consume out of income from different sources. He finds that the marginal propensity to save out of remittances is higher (at 0.711 for external remittances and 0.589 for internal remittances) than that for any other source of income. Although he notes that these results do not conform to unmodified lifecycle consumption models, Adams suggests that this is due to income volatility and risk aversion, noting that income sources with greater variability exhibit greater marginal propensities to save. While Adams is able to distinguish between different MPC out of sources of equally liquid income, he does not look at how this income might be spent. The IHS98 reveals similar variance in remittance and salary incomes (with standard deviations of 1899 and 1949 respectively). Adam's hypothesis would suggest that salary and remittance income should exhibit similar MPCs (which is shown not to be the case). The standard deviation of farm income is lower at 562.

2.4.1 Theoretical background

Traditional lifecycle consumption models have rational individuals maximising utility from total lifetime income subject to their budget constraint. Utility is some function of consumption in each period. An individual who lives for T periods will therefore maximise the following function at time *t*:

$$\underset{c_t, t=0,1,\ldots T}{Max}\ U(c_t, c_{t+1}, \ldots, c_T) \equiv U_t \qquad u'(c)>0 \text{ and } u''(c)<0 \qquad \textbf{(2.8)}$$

subject to his/her budget constraint which ensures that the total lifetime consumption cannot be greater than their total lifetime income:

$$\sum_{t=1}^{T} c_t \le (1+r)^t A_0 + \sum_{t=1}^{T} Y_t \left(\frac{1}{1+r}\right)^t \qquad \textbf{(2.9)}$$

where A_0 is initial wealth, Y_t wage income and r the constant, known interest rate[7].

With marginal utility decreasing in consumption, the maximising agent will set consumption in each period to be equal. That is, $c_1=c_2=\ldots=c_T$ since this will ensure $u'(c_1)=u'(c_2)=\ldots=u'(c_T)$ and total lifetime utility is maximised. Consumption in each period is thus an equal proportion of total expected lifetime income:

$$c_t = \frac{1}{T}\left\{(1+r)^t A_0 + \left[\sum_{t=1}^{T} Y_t \left(\frac{1}{1+r}\right)^t\right]\right\} \qquad \text{for every } t \qquad \textbf{(2.10)}$$

Perfect capital markets are assumed so that even as income fluctuates, agents are able to borrow and save in order to ensure constant consumption over their lifetime (equal to c_t, or "permanent income", y^p). As agents borrow and save, the value of their assets (which can be positive or negative in any given period) fluctuates according to: $A_{t+1}=(1+r)A_t+y_t-c_t$.

In this basic model, agents lump all wealth together. A $1 increase in the value of one's home should be spent in the same way as a $1 increase in wage income. Agents are rational maximisers who exhibit no self-control difficulties. They maximise utility given information available and carry out their plans with the utmost dedication. Given these

[7] I abstract from expectations for simplicity and to focus on the relevant parts of the model.

hypotheses it is perhaps not surprising that empirical studies find a number of anomalies in human behaviour for which explanations must be found.

Several theories exist to explain consumption behaviour – notably the permanent income hypothesis (PIH). This suggests that people consume in line with their permanent lifetime income – that is, their expected average yearly income is equal to consumption. When income is lower than this (e.g. students), individuals borrow to increase their consumption, and when their permanent income is above the expected average, they save (either by repaying past loans, or by saving for pensions).

This methodology means that individuals have both expected changes in income, and unanticipated shocks (innovations). Research has shown that individuals do not react in the 'correct' way to these, but rather, exhibit excessive smoothness to income innovations (that is, they do not consume as much as they should), but excessive sensitivity to current (anticipated) income changes – that is, consumption tends to be closer to current income than the theory postulates that it should.

Several explanations for these anomalies have been suggested. For example, it is possible that individuals are unable to borrow and save as they would desire. However, mental accounting suggests that this is not the case, and that individuals actually *choose* to use current income in a different way to future income. Several studies have shown that this is the case (e.g. Levin, 1998).

However, to date, no study has been made of income from different, *equally liquid*, income sources. This chapter aims to help fill this gap. It allows people to view and use not only income from differently liquid sources in a different way, but also permits equally liquid income to be used differently – something that the PIH does not allow in its framework. Indeed, any evidence that suggests that individuals do treat equally liquid income sources differently suggests that people behave in a different way to that which the PIH would suggest.

2.4.2 Psychological extensions and evidence

Empirical studies find excess sensitivity of current consumption to current income and excess smoothness with respect to income innovations. Capital market imperfections are often cited as an explanation of the former, although this explanation performs badly

when compared with behavioural hypotheses (Shefrin and Thaler, 1988; Lewis and Winnett, 1995; Levin, 1998). One key presupposition of the model often questioned is the assumption that humans do not exhibit preference reversal over time (given no additional information). An alternative is to abandon exponential discounting of the future in favour of a hyperbolic (or quasi-hyperbolic) consumption model. Psychological analysis of human preferences favours quasi-hyperbolic discounting which allows dynamic inconsistencies in preferences (Angeletos et al., 2001)[8].

In their behavioural lifecycle model, Shefrin and Thaler (1988) propose a complementary explanation. They suggest that there are two selves: a "planner", who maximises utility as per the neo-classical utility function, and a "doer" who carries out all decisions but who is myopic in nature and suffers a psychological "willpower" cost to reducing consumption when the planner dictates this to be necessary. The two selves often have mutually inconsistent preferences but coexist at all times. This is complementary to quasi-hyperbolic discounting models in which current selves seek to impose constraints on future selves in order to resolve the conflict between the two.

The psychological cost of avoiding current consumption (inversely related to a "temptation level") depends upon current consumption opportunities. Borrowing from Shefrin and Thaler (1988), X_t is defined as the opportunity set of current feasible choices of consumption. The unrestrained doer would maximise u_t on X_t, maximising consumption and utility in period t. The planner attempts to intervene but reducing today's consumption carries a psychological willpower cost, w_t[9]. Thus, doer utility is defined as:

$$z_t = u_t - w_t \qquad \textbf{(2.11)}$$

[8] Quasi-hyperbolic discounting takes the form: $U_t = C_t + \beta\delta C_{t+1} + \beta\delta^2 C_{t+2} + \beta\delta^3 C_{t+3} + \ldots$ where δ represents the normal exponential discounting. The function is essentially a normal exponentially discounted utility function augmented to discount all future consumption by an additional $0 \leq \beta \leq 1$. Hyperbolically discounted utility initially falls faster as consumption is further away in time than its exponential counterpart, but then begins to fall slower. Hyperbolic discounting allows for preference reversals found in the psychology literature.

[9] This assumes conflict between the planner and the doer. This would arise where the planner's optimal solution requires reducing current consumption in order to save for, say, retirement. Note that, the doer and planner are not in conflict *per se*. A young person earning below his or her permanent income level would do well to dissave in order to increase current consumption according to the planner's optimum.

Willpower effort is effective if the maximised values of z_t and u_t are not the same. In this case, the doer has successfully reduced consumption today so that it is nearer the planner's optimal level. A willpower effort variable, ϑ_t indicates the amount of willpower exercised at date *t*. $\theta_t^*(c_t, X_t)$ gives the degree of willpower effort required at consumption level c_t given the opportunity set X_t. In order to reduce consumption at any level, an increase in willpower is required. Any increase in willpower is painful since the corresponding reduction in consumption reduces z_t. Furthermore, increasing willpower becomes increasingly painful as additional willpower is applied (this follows also from the assumption of concave utility).

$$\frac{\partial \theta_t^*(\bullet)}{\partial c_t} < 0 \qquad \frac{\partial z_t}{\partial \theta_t} < 0 \qquad \frac{\partial^2 z_t}{\partial c^2{}_t} < 0 \qquad \textbf{(2.12)}$$

Given these costs, the planner must find means to resolve the conflict. He can do this by imposing a series of restraints in order to both reduce the opportunity set of the doer, X_t and make the willpower effort less painful. Karlsson (2003) shows that consumers are aware of this conflict and routinely implement different strategies in order to cope.

One option is to impose external restraints. For example, money can be physically placed in an account allowing no withdrawal (pensions for instance). This voluntary reduction of future opportunity sets is comparable with what Karlsson calls "desire-reducing strategies". Another example might be that the individual may vote for compulsory state social security programmes funded through (involuntary) taxation.

Karlsson's second group of strategies aimed at resolving internal inconsistencies can be termed "willpower strategies". Internal constraints are imposed and heuristic or "rule-of-thumb" behaviour is adopted. Mental accounting rules such as "consume out of savings only in the event of an emergency" are an example of this behaviour. There is a psychological cost to breaking the rule. In order for the rule to be effective, this cost must be greater than the willpower costs associated with reducing consumption to the level required if the rule is to be successfully adhered to.

Psychology literature such as Ainslie (1975)[10] suggests that the easiest rules to obey are those which become habits (saving for example, may become habitual). Exceptions must be rare and well-defined, and the rules must be dynamically stable: it is difficult to break habits[11].

Mental Accounting permits households to become accustomed to allocating money for specific purchases or categories of goods. Current earned income may be used to fund every-day necessities, but to make these same purchases out of money allocated to savings carries a high psychological cost which is greater than the willpower cost of forgoing the extra consumption. Thaler (1990) points out that many Americans regard savings in their Individual Retirement Accounts (IRA) to be "off-limits" except in the most dire of emergencies.

Shefrin and Thaler (1988) divide Mental Accounts into three components: current spendable income (Y), current assets (A) and future income (F). Under the traditional lifecycle consumption model, a special example of the behavioural lifecycle model where the psychological cost of reducing consumption is zero, the MPC out of all three categories is equal. Under the BLC model the different mental accounts would exhibit different MPC since the psychological cost of consuming out of current income is lower than that of consuming out of future income. Otherwise put, current income exhibits a higher temptation level than future income. Given these different psychological costs, Shefrin and Thaler (1988) suggest that we should observe a much higher MPC out of current income than out of future income.

$$c = c(Y, A, F) \quad \textbf{(2.13)}$$

$$\frac{\partial c}{\partial Y} \neq \frac{\partial c}{\partial A} \neq \frac{\partial c}{\partial F} \quad \textbf{(2.14)}$$

This offers an alternative explanation to the anomaly of excess sensitivity to current income posed by the traditional model and performs well in empirical studies against other explanations including capital market imperfections (Levin, 1998).

[10] Brocas, Carrillo and Dewatripont (2004) review various commitment devices.
[11] Anderson and Nevitte (2006) find that saving behaviour is largely a matter of habit. Furthermore, these habits are, at least in part, learnt in the home as a child.

Levin (1998) finds that an increase of $1 in income raises total spending by 42 cents while an increase of $1 in the value of all assets raises total expenditure by just 2 cents. Shefrin and Thaler (1988) and Lewis and Winnett (1995) use surveys[12] to show that the source of the income and the amount of income are both important in placing income in one account or another. A windfall gain is likely to be placed in the asset account (perhaps savings) while several small gains adding up to the same value tend to be placed in the current income account, even when both of these income gains are anticipated. Analysing the claim that the large bi-annual bonuses (which are the norm in Japan) contribute to the comparatively high savings rate, Ishikawa and Ueda (1984) estimate MPC from regular and bonus income for Japanese workers. They find that for non-recession years, MPC is significantly higher for regular income than for bonus income (0.685 versus 0.437). It appears that in Japan, households habitually save around half of their bonus income and these authors conclude that, at least in the short run, habits govern household expenditure patterns.

Extending this analysis, Feldman (forthcoming) analyses a change in the American tax laws resulting in decreased monthly tax deductions whilst reducing compensating tax rebates (or increasing payments) at the end of the year. There was no change in the marginal tax rate. Since the decreased deductions allowed households to gain only a comparatively small amount per month whilst the rebates tended to be large, Feldman (forthcoming) suggests that the lump sum would be placed in a mental savings account whilst the small monthly increase would go into the consumption pot. Traditional theory predicts that people would realise that their financial position had not changed and would simply save an additional amount per month to compensate. Her results suggest however that this seemingly innocuous change had an adverse impact on retirement savings. This is in line with the mental accounting hypothesis[13].

The fact that the source of income is important in the allocation of income to different accounts is key in Chapter 6. Income might be placed automatically (habitually) into a particular account and there are psychological costs to transferring it. Income which falls

[12] In the United States and Netherlands respectively.

[13] It should be noted that this change was framed by the US government as a “pseudo- ” tax cut influencing further households’ budgeting choices. Kahneman and Tversky (1984, 1986) discuss framing and their relevance in consumption choices.

into the future account, F, will not be moved if these internally-imposed costs are greater that the willpower effort associated with the corresponding reduction in consumption.

Support for the hypothesis that the source helps to determine the account is offered by Cherry (2001) who finds that people are more likely to exhibit "other-regarding behaviour" when money is a gift than when it is earned, suggesting a system of mental accounts. Henderson and Peterson (1992) find that people are more likely to purchase a vacation when they receive $2,000 as a gift than as a work bonus while O'Curry (1996) finds that people are more likely to purchase frivolous goods with winnings from a football pool than an equivalent sum from overtime pay. This evidence suggests that a more complex system than pooling all income and then allocating money to mental accounts is in operation. Rather, the source (amongst other factors) actually plays a role in determining the mental account into which income is assigned.

The evidence suggests not only that mental accounts exist as a means of controlling behaviour but also that different sources of income are credited to different mental accounts[14].

Since accounts are used for specific purposes, Levin (1998) calculates MPC for different categories of goods. He finds that large purchases such as holidays or durable goods are more likely to be purchased out of the asset account and groceries out of the current income account. He divides the asset account into liquid and illiquid assets and finds that the MPC out of the liquid asset account is positive for some categories of goods while the MPC out of the illiquid asset account is never significantly different from zero. This is true for those whom he considered to be credit constrained and those who are not, indicating that capital market imperfections are not a determining factor and that the costs of consuming out of illiquid assets consist largely of self-imposed psychological costs. This is

[14] Hart (2005) suggests that culture is a determinant in how people or households view money and their attitudes towards it. Although some forms of mental accounting may be near universal, its exact form is likely to be influenced by cultural and other factors. China for instance has a savings culture, whilst Japanese household finance is traditionally organised by females. Religion may play a role where moral codes or duties (such as *zakat* in Islam) encourage particular attitudes. Gender and age may also be factors in determining mental account systems (as well as interactions between these two variables and other factors). Financial *savoir faire* will impact on mental accounting systems and can be related to availability of information within a country (institutions and education are important in this aspect as well as the typical financial culture within a home). Similarly, consumption needs and choices will influence the mental accounting structure. These needs and choices will, in turn, be influenced by surroundings, culture, religion, age, etc. (Colloredo-Mansfeld, (2005) summarise the link between culture and consumption).

supported by the laboratory studies of Shefrin and Thaler (1988) and Lewis and Winnett (1995).

Levin (1998) extends the theory in Shefrin and Thaler (1988) to separate assets. That is, he hypothesises that the MPC out of different assets will differ. For example, the MPC out of changes in wealth invested in shares will not be equal to MPC out of changes in housing value. He finds that for three out of the eight spending categories, the coefficients on housing assets and liquid assets are significantly different. The impact of housing wealth is never significantly different from zero suggesting that changes in housing value has no effect on consumption at all. Future income has more explanatory power suggesting that households are more comfortable consuming out of future wealth (change in expected future income) than other forms of non-liquid wealth.

In addition, he tests the hypothesis that liquidity constraints are responsible for the differing MPC rather than behavioural mental accounting reasons. Levin (1998) divides the data into those whom he judges to be liquidity constrained and others. He finds that the unconstrained group has a lower MPC out of illiquid forms of wealth than those who are constrained, the opposite to the result that would be expected if liquidity constraints were responsible.

Theoretically, the test between external and internal liquidity constraints rests on the fact that if the liquidity constraint is external, the value of illiquid assets will impact on consumption as long as other more liquid assets are still being held. This is because the increase in the value of this asset will simply increase total wealth. The value of illiquid assets will cease to affect consumption when the more liquid assets are depleted, because only then will the liquidity constraint become binding. When the liquidity constraint is internally imposed however, whilst the more tempting (more liquid) assets are not depleted, the value of the less tempting assets will not impact on consumption decisions unless more liquid (more tempting) assets have been exhausted. Formally, conventional model expenditure patterns will follow:

$$\frac{\partial c}{\partial A_{illiquid}} > 0 \text{ where } A_{liquid} > 0 \quad \text{and} \quad \frac{\partial c}{\partial A_{illiquid}} = 0 \text{ where } A_{liquid} \approx 0 \qquad \textbf{(2.15)}$$

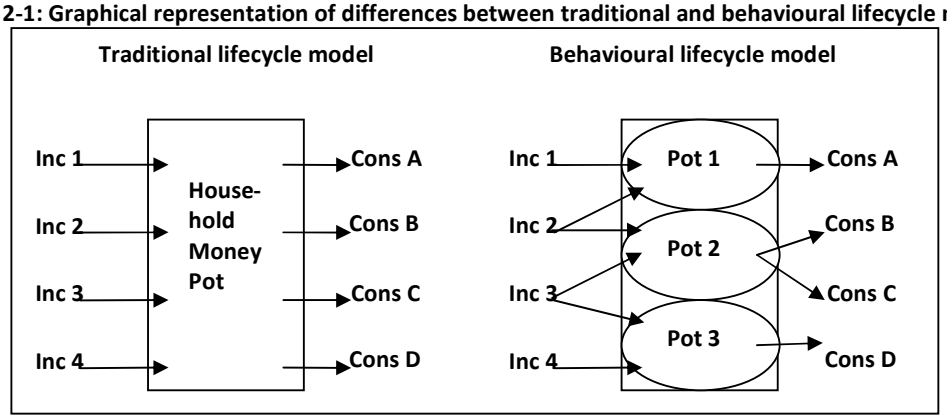
while the behavioural model with internally-imposed constraints will follow:

$$\frac{\partial c}{\partial A_{illiquid}} = 0 \text{ where } A_{liquid} > 0 \quad \text{and} \quad \frac{\partial c}{\partial A_{illiquid}} > 0 \text{ where } A_{liquid} \approx 0 \qquad \textbf{(2.16)}$$

The results are more in harmony with a behavioural lifecycle model of mental accounting where the constraints are internally imposed than with a conventional model with liquidity constraints.

Chapter 6 extends the mental accounting literature to show that the MPC out of different, *equally liquid* sources of income differ and goes on to analyses the main uses of remittance income. Figure 2-1 illustrates the key differences between the traditional and behavioural life cycle models which are tested in Chapter 6.

Figure 2-1: Graphical representation of differences between traditional and behavioural lifecycle models



Notes: ***Inc i*** *indicates income from source i=1,2,…;* ***Cons j*** *indicates consumption of good category j=A, B,… . In tests in Chapter 6, all income sources (including remittances) are equally liquid.*

2.5 REMITTANCES AS INSURANCE

2.5.1 Remittances as an ex-post coping strategy

Studies analysing actions taken by households in order to cope following shocks tend to focus on estimating which of a variety of potential coping strategies at their disposal households choose to use following different shocks. Harrower and Hoddinott (2005) model remittances as an ex post coping strategy following a shock using a panel logit model described by (2.17) to estimate the probability of receiving remittances from each of several sources.

$$\Pr(\text{Remittances}^{h}_{v,t}) = \frac{\exp(\mu_h + \beta S^{h}_{v,t} + \varphi X)}{1 - \exp(\mu_h + \beta S^{h}_{v,t} + \varphi X)} \qquad \textbf{(2.17)}$$

where $S^{h}_{v,t}$ indicates a shock suffered by household h in village v at time t, and X captures all household characteristics.

They find that asset poor households receive gifts in kind following livestock loss. Migration is used as a coping strategy for all groups in the case of crop or livestock loss.

Fafchamps and Lund (2002) take a similar perspective, but model the value of gifts/remittances received and the value of loans taken following shocks, rather than the likelihood of a household engaging in these strategies. Using carefully collected data, they are able to construct network variables indicating the characteristics of households within the same informal lending and gift networks and include these as regressors, as well as both household shocks and network shocks. They therefore use (2.18) for both remittances received and loans.

$$y^{h}_{t,n} = \alpha + \beta S^{h}_{t,n} + \delta S_{t,n} + \varphi X^{h} + \gamma X_{n} + \varepsilon^{h}_{t,v} \qquad \textbf{(2.18)}$$

where $y^{h}_{t,n}$ represents income from gifts/remittances and credit. The village variables are replaced with network variables denoted by the n subscript. Different specifications of (2.18) allow for the inclusion of household and village fixed effects which also, in some specifications act as instruments for the subjective shock variables. They instrument shocks using household characteristics since it is possible that households' ability to cope with shocks is correlated with the likelihood of being subject to a shock.

Fafchamps and Lund (2002) find that both borrowing and gift income increase following shocks, and households whose networks face negative shocks see gift and loan income decrease. When shocks are instrumented, network shocks impact negatively on borrowing, but do not affect gifts. The authors suggest that this is because many gifts are ritual in nature (e.g. funerals) causing the gifts to be made to meet social obligation even in the face of network shocks. Focussing on specific shocks, households having to meet funeral expenses increase their borrowing and see an increase in remittance income. Unemployment is insured through borrowing.

Fafchamps et al. (1998) estimate a version of (2.18) with livestock sales as a dependent variable. They analyse livestock sales following shocks and find weak evidence that livestock sales help to compensate for a small percentage of loss resulting from shocks. Decomposing shocks into idiosyncratic and covariant shocks reveals that there exists some degree of risk sharing amongst households in villages.

Park (2006) estimates similar ex post coping strategy models to (2.18) using Seemingly Unrelated Regression (SUR) and estimating the value of net transfers received; sale of assets; loans; and number of household members working (as a proxy for increased labour market participation). He finds that net remittance income increases when the household head has a child that lives outside of the village of origin, but decreases if children live within the village. Remittances increase as household economic status (as measured by education, age and sex of the household head) declines, and decrease following economic hardship. The author suggests that this is indicative of the fact that most shocks are covariant in nature. Households which are isolated from other households tend to sell livestock during following shocks, whilst other households do not. Unfortunately, Park (2006) treats all shocks equally as one “hardship dummy”, and fails to control for village fixed effects in this analysis.

Pan (2007) uses Ethiopia Rural Household Survey and takes a similar perspective to Park (2006), modelling the amount of transfers received by households. She estimates the model separately for transfers received from the Ethiopian Government / Non-Governmental Organisations and transfers from friends / family members. Pan (2007) first models expected income, and treats the error terms as the shock variable. This is

decomposed into continuous idiosyncratic and covariant shock variables which are then entered into the regressions estimating receipt of remittances. To check for robustness of her models, the shock variables are instrumented using lagged shocks. She finds that covariant income shocks are partly insured by government transfers and NGOs, but idiosyncratic shocks are not. There is also weak evidence to suggest that idiosyncratic income shocks are partly insured by transfers from friends and relatives, but these networks do not insure covariant shocks.

2.5.2 Consumption smoothing models

This constitutes the second main branch of the theoretical and empirical models used for understanding the impact of shocks in developing countries, and the extent to which they are insured.

Under the perfect risk sharing hypothesis idiosyncratic shocks should not impact on the growth in consumption once aggregate shocks are taken into account. Cochrane (1991) proposes a simple test for complete consumption insurance.

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta S_{t,v}^{h} + \varepsilon_{t,v}^{h} \qquad \textbf{(2.19)}$$

where the left hand side variable is household h in village v's non-durable consumption growth, and S represents idiosyncratic shocks. Under perfect consumption insurance, β=0, that is, idiosyncratic shocks have no impact on change in consumption. This specification however, needs to be augmented to control for community shocks. Thus, either community shocks can be entered directly (e.g. Gertler and Gruber, 2002) or community and time interactions can be used to control for unobserved aggregate shocks (Skoufias and Quisumbing, 2003; Harrower and Hoddinott, 2005). Some authors (Mace, 1991; Townsend, 1994; Asfaw and von Braun, 2004) use change in average community income in place of the unobserved community shocks. Household characteristics, X are also included as control variables (Harrower and Hoddinott, 2005; Dercon et al., 2005; Skoufias and Quisumbing, 2003).

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta S_{t,v}^{h} + \delta S_{t,v} + \varphi X^{h} + \varepsilon_{t,v}^{h} \qquad \textbf{(2.20)}$$

In (2.20), using shocks, rather than change in income is justified by the theory that shocks change income, which in turn impacts on consumption[15]. Mace (1991) also suggests that it is preferable, since a zero coefficient on change in income is an extreme test of consumption smoothing as it suggests that both permanent and transitory income are insured whilst a zero coefficient on a shock variable suggests that it is merely the shock that is insured, and not its impact on permanent income. Since shocks are assumed to affect the growth rate of consumption through their impact on income, numerous authors (e.g. Harrower and Hoddinott, 2005) estimate regressions using household income, rather than shocks and round and regional dummies. So that,

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta \Delta(\ln y_{t,v}^{h}) + \sum_{t,v} \delta_{t,v}(D_{t,v}) + \varphi X + \varepsilon_{t,v}^{h} \qquad \textbf{(2.21)}$$

where D are round and region dummies. Dercon and Krishnan (2000) perform regressions similar to (2.20) to find that both idiosyncratic shocks and the covariant village rainfall index impact on consumption with the coefficient on village rainfall being significantly more important than those for idiosyncratic shocks.

Several authors have also chosen to use change of the log of average community (or "risk-sharing network") income, $\Delta(\ln \overline{y}_{t,v})$ as a proxy for community shocks (Mace, 1991; Townsend, 1994; Asfaw and von Braun, 2004) as in (2.20)[16]:

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta S_{t,v}^{h} + \delta \Delta(\ln \overline{y}_{t,v}) + \varphi X^{h} + \varepsilon_{t,v}^{h} \qquad \textbf{(2.22)}$$

Analysing consumption smoothing in Columbia and Nicaragua, Barrera and Pérez-Calle (2005) note that a "particular group of observations [may have] a different consumption smoothing parameter than the general one", given by β. They therefore allow the slope and intercept of this parameter to vary for different categories of households. This may,

[15] A basic regression revealed that, in the data set used, covariant shocks impacted on income levels, whilst household shocks did not. Shocks and income *levels* are investigated in more detail in section 7.4, but the output of this initial basic regression is given by:

Income before remittances = 7.27 + 0.02*Sick member + 0.14*Death - 0.30*Flood – 0.88*Drought
(0.27) (0.74) (-1.99) (-3.12)

where t-statistics are given in parentheses below the coefficients. N=2031; F=3.50; r2=0.0074.

[16] In addition, Dercon and Krishnan (2000) use village wages and prices to control for aggregate shocks, and with changes in shock variables, as in (7): $\ln \Delta c_{t,v}^{h} = \alpha + \beta \Delta S_{t,v}^{h} + \delta_2 \Delta w_{t,v} + \delta_3 \Delta P_{t,v} + \varphi X^{h} + \varepsilon_{t,v}^{h}$

for example, be relevant for rural/urban difference or, in Chapter 7, for households which receive remittances, and those which do not.

Barrera and Pérez-Calle (2005) include interaction terms as shown in (2.23), and this might also be tested by splitting the sample. Barrera and Pérez-Calle (2005) also estimate a version of (2.23) in which they replace shock variables with change in income. This analysis augments this to include interaction terms between both household and community shocks, and remittances.

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta S_{t,v}^{h} + I_1[\alpha^{I_2} + \beta^{I_2}(S_{t,v}^{h})] + \delta S_{t,v} + I_2[\alpha^{I_2} + \delta^{I_2} S_{t,v}] + \varphi X + \varepsilon_{t,v}^{h} \quad \textbf{(2.23)}$$

where I_1 represents interaction terms for household shocks, $S_{v,t}^{h}$, and I_2 interactions for community shocks, $S_{v,t}$.

Several authors have modified the models described in order to assess particular questions or deal with potential econometric problems. With regard to self-reported health shocks – one of the key reported shocks in Chapter 7 – Asfaw and von Braun (2004), Gertler and Gruber (2002) and de Weerdt and Dercon (2006) note the potential for measurement error, the predictability of this shock, and long run effects on consumption. In order to overcome the measurement error issue Asfaw and von Braun (2004) and Gertler and Gruber (2002) first difference the shock variable, as in (2.24) so that, in Gertler and Gruber (2002), it takes a value of 1 if a household member moves from ill to healthy and -1 if a member moves from health to ill. Under the assumption that measurement errors are specific to the individual and constant over the short period, this eliminates this problem. The issue of household characteristics such as education influencing such a judgement is eliminated through controlling for fixed factors, X, or household fixed effects.

$$\Delta \ln c_{t,v}^{h} = \alpha + \beta \Delta S_{t,v}^{h} + \sum_{t,v} \delta_{t,v}(D_{t,v}) + \varphi X^{h} + \varepsilon_{t,v}^{h} \quad \textbf{(2.24)}$$

Dercon et al. (2005), de Weerdt and Dercon (2006) and Fafchamps et al. (1998) look at the persistent effects of shocks on current consumption by estimating *current* consumption against recent and distant past shocks. In (2.25) below, lagged values of the

shock variables are introduced, with β_1 giving the short run impact of a given shock on current consumption, and β_2, the persistent impact. This model is therefore estimated in levels rather than differences.

$$\ln c_{t,v}^{h} = \alpha + \beta_1 S_{t,v}^{h} + \beta_2 S_{t-1,v}^{h} + \sum_{t,v} \delta_{t,v}(D_{t,v}) + \varphi X^{h} + \varepsilon_{t,v}^{h} \qquad \textbf{(2.25)}$$

Dercon et al. (2005) augment (2.25) by including lagged consumption as a dependent variable to control for initial income. Their model is given in (2.26):

$$\ln c_{t,v}^{h} = \alpha + \beta_1 S_{t,v}^{h} + \beta_2 S_{t-1,v}^{h} + \sum_{t,v} \delta_{t,v}(D_{t,v}) + \varphi X^{h} + \eta \ln c_{t-1,v}^{h} + \varepsilon_{t,v}^{h} \qquad \textbf{(2.26)}$$

The problem of predictability of health shocks is discussed in de Weerdt and Dercon (2006). They run a fixed effects regression estimating the probability of a health shock on household characteristics, consumption in period t-1 and time dummies. In order to verify the robustness of their results they are then able to run two versions of the standard model – one for the full sample, and one excluding all observations which had correctly predicted health shocks.

A final theoretical point to note concerns the dependent variable. Where data permit, most studies have chosen to estimate separate models for food and non-food consumption (e.g. Asfaw and von Braun, 2004; de Weerdt and Dercon, 2006; Barrera and Pérez-Calle, 2005; Gertler and Gruber, 2002; Park, 2006), since some categories of consumption might be insured whilst other are not.

2.5.3 Review of empirical evidence of shocks and consumption smoothing

This section focuses on evidence from developing countries. Studies estimating different versions of the basic hypothesis that shocks impact on consumption but can be insured have generated a wide range of results with some authors able to reject the full insurance hypothesis and others not. In general, results indicate that food consumption is more likely to be insured than other consumption, but this result varies depending upon the country studied. Health shocks are potentially devastating for a household but their largely idiosyncratic nature makes them a good candidate for insurance. Weather shocks are undoubtedly covariant in nature, and are therefore difficult to insure within the context of small communities. These two contrasting shocks are therefore especially

interesting to examine. This section reviews the key findings of recent empirical papers and a summary of key findings is presented in Table 2.2 below.

Table 2.2: Summary of key findings from studies of the risk sharing hypothesis

Study	Key conclusions
De Weerdt and Dercon (2006) - Tanzania	Unable to reject hypothesis that health shocks are insured. When only unexpected health shocks are included, a shock results in a 7.3% reduction in consumption
Asfaw and von Braun (2004) - Ethiopia	Household heads' health shocks impact negatively on purchased food consumption, but not on total food consumption - in-kind food gifts substitute for purchased food.
Barrera and Pérez-Calle (2005) - Colombia and Nicaragua	Health shocks have significant negative impact for Colombia. Urban households suffer more following shocks (less insured) than rural ones. Food consumption suffers less than non-food consumption.
Harrower and Hoddinott (2005) - Mali	Health shocks do not impact on change in consumption - these shocks are therefore fully insured. Loss of livestock has a negative impact. Household consumption affected by covariant shocks.
Gertler and Gruber (2002) - Indonesia	An income shock results in a consumption decrease of 0.35 units for each unit decrease in income. A decline in the health of the household head results in decreased labor market participation and therefore decreased wage income.
Irac and Minoiu (2007) - Romania	Household consumption varies with covariant shocks. Weather shocks cause households to increase non-food consumption by 55-75%, perhaps due to repairing damage. Poorer households' food consumption is as well insured as richer households but richer households better able to increase non-food consumption following crop damage (repairing damage?).
Dercon and Krishnan (2000) - Ethiopia	Higher than average rainfall has positive impact on consumption. Crop damage has positive impact on consumption (repairing damage?).
Dercon et al. (2005) - Ethiopia	Health shocks decrease household consumption by 9% and drought causes household consumption to decrease by 19%. The impact of these shocks is persistent, having an impact on consumption level despite having occurred 2-5 years previously.
Park (2006) - Bangladesh	Food consumption risk is pooled amongst small clusters of houses and amongst relatives. Food consumption is insured against shocks more effectively than non-food consumption.
Townsend (1995) - Thailand	Consumption insurance hypothesis rejected with MPC out of idiosyncratic changes of income of between 0.29 and 0.85 depending upon the region. Bangkok exhibits lowest degree of risk pooling. Farm households in north of Thailand exhibit highest degree of risk pooling and entrepreneurs the lowest.
Townsend (1994) - India	Health shocks and unemployment do not impact significantly on household consumption, and are therefore insured.

De Weerdt and Dercon (2006) analyse the impact of risk sharing networks in insuring food and non-food consumption against illness in rural Tanzania. They take advantage of a data set in which every household in a village was interviewed and asked to name who they turned to in the case of negative shocks. There were 1126 “network partners” for 120 households of which two thirds were within the village. This allows the authors to estimate their model replacing average village consumption with average network consumption for each household, constructed using the consumption of all other households in the sharing network which were one or two steps apart in terms of “geodistance”. They run first differences and instrumental variables (IV) regressions, instrumenting for network effects using changes in household characteristics, livestock values and remittances from outside the network. They also note that some health shocks are predictable, and so run a regression predicting health shocks based on first round household characteristics. The IV regression is then re-run excluding all households for which the model correctly predicted a health shock, that is, including only unpredicted health shocks. De Weerdt and Dercon (2006) are unable to reject the hypothesis that health shocks are insured, with the relevant coefficient being negative but insignificant in most cases. However, when only unexpected shocks are included, an unexpected health shock results in a 7.3 per cent decrease in consumption. Network consumption matters for insuring non-food consumption, but is not significant in the case of food consumption.

Asfaw and von Braun (2004) estimate the impact of negative health shocks for the household head on change in consumption in rural Ethiopia using (2.21). They include in their preference shifters, age of household head and its square, household size and the change in logged income, which is instrumented with lagged income and lagged asset ownership and, in some specifications, a wealth index is interacted with the illness dummy. They do not however include the wealth index on its own meaning that this is included only for households with sick members. They analyse purchased food consumption, total food consumption and non-food consumption (excluding medical expenses) separately, and find a negative and significant impact of illness on purchased food consumption, but no significant impact for total food consumption. They therefore conclude that household heads’ illnesses are insured through food gifts, and that purchased food stuffs and food gifts are substitutes. A positive and significant coefficient on their wealth index/illness interaction leads them to conclude that wealthier

households with less liquidity constraint tend to be better able to take advantage of risk sharing. The fact that they do not include wealth assets as an individual regressor for the whole sample means that this conclusion may be questionable. Non-food consumption is not insured against health shocks.

Barrera and Pérez-Calle (2005) estimate (2.23) for food consumption and total consumption using data from Colombia and Nicaragua. They include health shocks for the household head and other members, death and childbirth. They also include indicators for unemployment, and natural disasters such as flood and drought. The interaction term described in (2.23) allows them to capture differences between asset-rich households and others whilst rural/urban differences are captured by splitting the sample and re-estimating their model for each group. All regressions are run separately for each country. The authors find that health shocks and death have a significant and negative impact on change in consumption for Colombia, whilst few other shock variables are significant. Substituting income for shock in (2.23) the authors find that a one unit change in income leads to a 0.065 unit change in consumption in Colombia, and a 0.091 unit change in Nicaragua with urban households exhibiting more response than rural ones. In addition, the impact on food is less than on total consumption. This should not be surprising since food consumption is likely to be less elastic than other consumption. In most models, home ownership plays no role in smoothing income.

Analysing rural Mali, Harrower and Hoddinott (2005) find similar results to Barrera and Pérez-Calle (2005). Harrower and Hoddinott (2005) find a similar negligible propensity to consume out of income changes of between zero and 0.07. They split the sample to analyse positive and negative shocks separately and find that consumption responds more strongly to positive shocks than negative ones, with elasticities of 0.116 and 0.041 respectively. Income changes do not appear to impact on consumption changes for asset poor households. Harrower and Hoddinott (2005) find that, after controlling for household characteristics and covariant shocks, only one of the three shocks included in the study impacts on consumption change. Loss of livestock due to theft or death has a negative impact, and is significant in most model specifications. Illness or inability to cultivate available land has no impact.

Gertler and Gruber (2002) use Indonesian data to analyse the impact of various definitions of ill health on labour force participation and consumption. They exclude medical expenditure from total consumption and find that if the household head moves from the highest level of their health index (Activities of Daily Living (ADL) index) to the lowest level, household consumption reduces by 20 per cent. Next, they re-estimate their model replacing the shock variable with change in income. An OLS regression suggests that for each unit decrease in income, consumption falls by 0.03 units. Instrumenting for the change in income in order to take into account its potential endogeneity however, results in a decrease in consumption of 0.35 units for each unit decrease in income. The link between health and income is tested by estimating a version of the model described with change in labour market participation as the dependent variable. A decline in the health of the household head results in decreased labour market participation, and therefore decreased wage income.

Irac and Minoiu (2007) study 364 rural Romanian households using data collected in 2003 and 2004. They regress food, non-food and total consumption separately and include weather shock, crop failure, illness, unemployment and maternity as well as region-round interaction dummies. For each dependent variable, Irac and Minoiu (2007) run an OLS regression, and 2SLS instrumenting for number of newborn children and, perhaps surprisingly, for change in number of children under 14 years, using the age of the household head and its square, education of household head and the lagged number of members as instruments. As in Harrower and Hoddinott (2005), F-tests for the null hypothesis that region-round interaction dummies are jointly equal to zero are strongly rejected. They therefore conclude that household change in consumption varies with regional shocks. The weather shock dummy indicates that households which suffer from this shock increase their non-food consumption by 55-75 per cent. Households are then classified into rich and poor categories, and (2.23) is estimated using interaction variables. The authors conclude that there is "no evidence that richer households better insure food consumption than poorer households. However, after crop failure, richer households' growth rates of non food consumption … and total non-durable consumption are higher than those of poorer households" [p.169].

Park (2006) estimates models for rural Bangladesh using OLS and 2SLS in which change in income is instrumented with land ownership and non-farm business assets. Food and

non-food consumption are estimated separately although results are similar. He also estimates separate models for households within a village, within a cluster (part of a village) and for related households in different villages. Park (2006) finds evidence that food consumption risks are pooled within small clusters, and amongst relatives living in different villages, but not within non-related households in different villages. Generally, elasticities for non-food consumption are greater than those for food consumption, as one would expect. Finally, non-relatives appear to share risks to non-food consumption more than relatives.

Dercon et al. (2005) estimate (2.26) using data collected in rural Ethiopia in 1999 and 2004. They include covariant and idiosyncratic shocks including climatic shocks such as drought, health and crime. Descriptive statistics reveal that idiosyncratic and covariant shocks have a similar reported impact on consumption or asset loss (assets are sold in order to maintain consumption) on average for a household. They find that few of the shocks impact on consumption. Exceptions are drought and illness of a household member. Those shocks occurring between 1999 and 2004 decrease household consumption by 19 and 9 per cent respectively. They go on to disaggregate shocks occurring between 2002-2004 and 1999-2001 to enter them separately to assess the persistence of shocks. They find that drought and illness occurring between 1999 and 2002 decrease 2004 consumption by 13 and 14 per cent respectively. A decrease in the price of agricultural produce has a persistent negative impact on consumption in the main agricultural regions of the country. Similar results are obtained whether or not 1999 (initial) consumption (instrumented with further lags, and lagged asset ownership) is included as a regressor.

Dercon and Krishnan (2000) estimate a version of the basic model using panel fixed effects for three rounds of rural Ethiopian data and capturing covariant shocks with wages, which is itself proxied with a dummy indicating peak labour period for the village. They find that village rainfall index has a strongly positive impact on consumption. Increased prices have a negative impact on consumption and consumption increases during the peak labour period. Perhaps surprisingly a higher crop damage index and having suffered from livestock disease has a positive impact on consumption.

Townsend (1994, 1995) studies Thai and Indian data to estimate various versions of the basic model described above. He finds that, for India, neither unemployment nor sickness impacts significantly on household consumption. Furthermore, the largest "marginal propensity for a household to consume out of idiosyncratic changes in income [was] 0.14 in any of the three villages". There is thus a significant degree of risk sharing. Studying Thai data, he rejects emphatically the consumption insurance hypothesis, with marginal propensities to consume out of idiosyncratic changes in income of between 0.29 and 0.85 depending upon the region, with Bangkok exhibiting the lowest degree of risk sharing. Re-running the regressions for different occupations, Townsend (1995) finds that farm households in the north do exhibit risk sharing, whilst entrepreneurs exhibit the lowest degree of risk-sharing. Attempting to answer the question "does insurance deteriorate with distance?", he replaces average county consumption with average national consumption, and analyses the impact on the coefficient on change in household income. He gets mixed results but finds that for farm households in three of the six regions studied, coefficients on household income increase significantly, leading to the conclusion that for this category of household, there exists less insurance at the national level, than within their own county. Townsend (1995) does not however have any data on the means of risk sharing, but rather concludes this on the basis of the strength of income shocks on consumption after controlling for average income at the county and then the national level.

Chapter 7 attempts to improve on this last result using data on the geographical source of remittances, one of the main means of risk sharing. In addition, data on shocks themselves, rather than simply income, allow to test whether remittances from different geographical sources are used to compensate for different shocks.

2.6 CONCLUSION

This chapter has discussed the literature related to each part of a remittance flow when viewed from an individual or household level. In 2.3 the literature on motivations to remit is considered, finding that different studies draw different conclusions. Indeed there appears to be elements of altruism, (co-)insurance, investment and payment for current or past services in remittance flows.

Section 2.4 focused on mental accounting models and discussed conclusions of relevant studies. There is widespread support for the mental accounting hypothesis that people

both view and treat income from different sources differently. How this works in practice is, however, likely to be strongly related to the culture and context. Similarly, there is no clear agreement on how remittances are used with evidence varying according to the country of study.

Section 2.5 looked at the insurance literature in a development context. Here, the evidence favours, on balance, the idea that households in developing countries are able to partly protect themselves against some types of shocks, but the evidence is not clear cut. In addition, there is little work regarding the source of the insurance (for example, savings, credit, remittances, sale of assets), although it is likely that households engage in a variety of coping strategies following a shock.

This thesis aims to extend the literature in each of these areas. Chapter 5 is able to compare the differing motivations for remitting depending upon the relationship between the sender and the receiver. In Chapter 6 the mental accounting hypothesis is extended to equally liquid income, and uses consumption functions to understand how remittances are used. Chapter 7 offers remittances as a source of insurance, and make the important extension that the geographical sources of remittances matter in an agricultural context in which weather plays a role in determining income causing local incomes to be strongly correlated.

2.7 APPENDIX

This appendix gives calculations from models discussed in section 2.1.

Altruistic model

The utility functions of the sender, s and receiver, r are shown below:

$$U^s(C^s, C^r) = (1-\beta^s)V^s(C^s) + \beta^s U^r(C^r, C^s) \quad \textbf{(A2.1.1)}$$

$$U^r(C^r, C^s) = (1-\beta^r)V^r(C^r) + \beta^r U^s(C^s, C^r) \quad \textbf{(A2.1.2)}$$

Solve in terms of V(C):

$$U^s(C^s, C^r) = (1-\beta^s)V^s(C^s) + \beta^s(1-\beta^r)V^r(C^r) + \beta^r U^s(C^s, C^r)$$
$$= (1-\beta^s)V^s(C^s) + \beta^s(1-\beta^r)V^r(C^r) + \beta^s\beta^r U^s(C^s, C^r) = U^s(C^s, C^r)$$
$$\rightarrow (1-\beta^s)V^s(C^s) + \beta^s(1-\beta^r)V^r(C^r) = U^s(C^s, C^r) - \beta^s\beta^r U^s(C^s, C^r)$$
$$\rightarrow (1-\beta^s)V^s(C^s) + \beta^s(1-\beta^r)V^r(C^r) = (1-\beta^s\beta^r)U^s(C^s, C^r)$$
$$\rightarrow \frac{(1-\beta^s)}{(1-\beta^s\beta^r)}V^s(C^s) + \frac{\beta^s(1-\beta^r)}{(1-\beta^s\beta^r)}V^r(C^r) = U^s(C^s, C^r)$$

$$Define \frac{\beta^s(1-\beta^r)}{(1-\beta^s\beta^r)} \equiv \gamma^s$$

$$Note \frac{(1-\beta^s)}{(1-\beta^s\beta^r)} = 1 - \frac{\beta^s(1-\beta^r)}{(1-\beta^s\beta^r)}$$

$$Since 1 - \frac{\beta^s(1-\beta^r)}{(1-\beta^s\beta^r)} = \frac{1}{1} - \frac{\beta^s - \beta^s\beta^r}{(1-\beta^s\beta^r)} = \frac{1-\beta^s\beta^r - \beta^s + \beta^s\beta^r}{(1-\beta^s\beta^r)} = \frac{(1-\beta^s)}{(1-\beta^s\beta^r)}$$

$$So U^s(C^s, C^r) = (1-\gamma^s)V^s(C^s) + \gamma^s V^r(C^r) \quad \textbf{(A2.1.3)}$$

Incorporating transfers, consumption can be re-written to be equal to income, I, less transfers, T. Thus:

$$U^s(C^s, C^r) = (1-\gamma^s)V^s(I^s - T) + \gamma^s V^r(I^r + T) \quad \textbf{(A2.1.4)}$$

To find the optimal level of transfers from the sender's perspective, maximise the sender's utility with respect to transfers:

$$\frac{\partial U^s(\bullet)}{\partial T} = -(1-\gamma^s)\frac{\partial V^s}{\partial(I^s - T)} + \gamma^s \frac{\partial V^r}{\partial(I^r + T)} = 0(ifT > 0) \quad \textbf{(A2.1.5)}$$

Rapoport and Docquier (2006) then assume that there are no negative transfers from the sender to the receiver, and impose a felicity function satisfying V'>0 and V''<0, V(.)=ln(.). Thus:

$$\frac{\partial U^s(\bullet)}{\partial T} = -(1-\gamma^s)\frac{1}{(I^s - T)} + \gamma^s \frac{1}{(I^r + T)} = 0(ifT > 0) \quad \textbf{(A2.1.6)}$$

Then solve for the optimal level of transfers from the sender's perspective, T*:

$$\frac{\partial U^s(\bullet)}{\partial T} = -(1-\gamma^s)\frac{1}{(I^s - T)} + \gamma^s \frac{1}{(I^r + T)} = 0$$

$$\rightarrow \gamma^s(I^s - T) = (1-\gamma^s)(I^r + T)$$
$$\rightarrow \gamma^s I^s - \gamma^s T = I^r - \gamma^s I^r + T - \gamma^s T$$
$$\rightarrow \gamma^s I^s = I^r - \gamma^s I^r + T$$
$$\rightarrow \gamma^s I^s = (1-\gamma^s)I^r + T$$
$$\rightarrow T* = \gamma^s I^s - (1-\gamma^s)I^r$$

This has several properties:

(1) Transfers are increasing in the sender's income:

$$\frac{\partial T*}{\partial I^s} > 0, \frac{\partial T*}{\partial I^s} = \gamma^s = \frac{(1-\beta^s)}{(1-\beta^s\beta^r)} > 0 because 0 \le \beta^i \le 1/2 \quad \textbf{(A2.1.7)}$$

(2) Transfers are falling in the receiver's income:

$$\frac{\partial T*}{\partial I^r} < 0, \frac{\partial T*}{\partial I^r} = \gamma^s - 1 = \frac{(1-\beta^s)}{(1-\beta^s\beta^r)} - 1 < 0 \quad \textbf{(A2.1.8)}$$

In addition, Rapoport and Docquier (2006) note that:

(3) Transfers are increasing in the sender's degree of altruism:

$$\frac{\partial T^*}{\partial \beta^s} > 0 \qquad \textbf{(A2.1.9)}$$

(4) And that transfers are falling in the degree of altruism of the receiving household:

$$\frac{\partial T^*}{\partial \beta^r} < 0 \qquad \textbf{(A2.1.10)}$$

Insurance model

The sender's, s expected utility is given below:

$$EU = V^s(I^s - T) + (1-\pi)V^s(I_G^s) + \pi V^s(I_B^s + s) \qquad \textbf{(A2.1.11)}$$

Note that in the actuarially fair case, $T = \pi s$ so $s = T/\pi$. Thus, indemnities paid in the case of shock are increasing in transfers (at a constant rate):

$$\frac{\partial s}{\partial T} = \frac{1}{\pi} > 0 \qquad \textbf{(A2.1.12)}$$

Imposing log utility, expected utility becomes:

$$EU = \ln(I^s - T) + (1-\pi)\ln(I_G^s) + \pi \ln(I_B^s + s) \qquad \textbf{(A2.1.13)}$$

Solve for optimal level of transfers, T*:

$$\frac{\partial EU}{\partial T} = -\frac{1}{I^s - T} + \frac{1}{I_B^s + \frac{T}{\pi}} = 0$$

$$\rightarrow I_B^s + \frac{T}{\pi} = I^s - T \rightarrow I^s - I_B^s = \frac{T}{\pi} + T \rightarrow I^s - {}_B^s = T(1 + \frac{1}{\pi}) \qquad \textbf{(A2.1.14)}$$

$$\rightarrow \frac{I^s - I_B^s}{(1 + \frac{1}{\pi})} = T^* \rightarrow \frac{I^s - I_B^s}{(\frac{1+\pi}{\pi})} = T^* \rightarrow \frac{\pi}{1+\pi}[I^s - I_B^s] = T^*$$

This insurance model has several properties:

(1) Transfers are increasing in the sender's first period income (as with previous altruistic model):

$$\frac{\partial T^*}{\partial I^s} = \frac{\pi}{1+\pi} > 0 \qquad \textbf{(A2.1.15)}$$

(2) Transfers are decreasing in the sender's bad state income:

$$\frac{\partial T^*}{\partial I_B^s} = -\frac{\pi}{1+\pi} < 0 \qquad \textbf{(A2.1.16)}$$

(3) Transfers are increasing in the probability of a bad state (potentially proxied by education, unemployment or legal status if abroad):

$$\frac{\partial T^*}{\partial \pi} = \frac{I^s - I_B^s}{1+\pi} - \left(\frac{\pi}{1+\pi}\right)\left(\frac{I^s - I_B^s}{1+\pi}\right) > 0 \qquad \textbf{(A2.1.17)}$$

3 DATA DESCRIPTION AND EXPLORATION

3.1 INTRODUCTION

This chapter has two main aims. The first is to introduce the data used in each of the three main empirical chapters. To this end, relevant descriptive statistics of the main variables used are presented for each of the data sets. In addition, it is noted why the data used are suitable and useful for the purpose in each case.

Secondly, each data set contains unique information which can be informative regarding the empirical context of the overall study. Thus the Family Transfer Project (FTP) focuses on individual (rather than household) transfer behaviour, the 1998 Integrated ousehold Survey (IHS98) looks at differences between male and female headed households and the Complementary Panel Survey (CPS) contains information on differences between remittances receiving households, remittances sending households, and those which do not engage in remittance transfers at all.

Although each data set is unique with its own focus and information, some comparison is both possible and informative, and this is made in section 3.5.

Consumption details are not collected in the FTP. Instead asset indexes are used as a wealth indicator. In addition, data on wage income earned during the previous week is reported. This is imperfect as it excludes all non-wage cash income and all in-kind income.

Similar income details are collected in the IHS2 and the CPS. This is collected on both an individual level and household level, and data are then compared to ensure no duplication. Income includes that resulting from the sale of agricultural produce; paid income (including both salary income and casual labour); income resulting from business activities; remittances; and loans. More detailed questions are asked in a section on remittances.

Expenditure is collected at household level. This is considerably more detailed in the IHS2 than in the CPS. Each contain similar information on durable expenditure over the

previous year. However, the IHS2 allows individuals to report very detailed specific expenditure including 'stamps' and 'sports club membership fee'. This level of detail allows for the construction of various consumption categories, discussed below.

The CPS imposes more rigid consumption categories – for example, 'staple food'; 'vegetables'; 'meat or fish'; 'fertiliser'; and 'paraffin'. Data from these are used to construct a total consumption variable, a food consumption variable, and a non-food consumption variable.

The FTP collected data only in cash income in the form of wages. Data on both cash and in-kind remittances were collected however. In order to estimate the value of in-kind remittances, the compilers collected up-to-date market information in the place where the remittances were received. This allowed them to place cash values on in-kind remittance receipts, and it is these values which are used in the analysis in Chapter 5.

The IHS98 collected data on both cash and in-kind consumption. However, in order to test the mental accounting hypothesis, it is important that income be as fungible as possible and that the household is able to choose easily how to spend the income. For example, even though one might be able to convert an in-kind gift into cash and then to use the cash to purchase other goods, the transaction costs involved may be prohibitive. This would introduce a bias in the estimates towards consumption of the same goods given, when, with zero transaction costs, this would not be the case. Therefore, only cash income and consumptions are used in Chapter 6.

The CPS collected data on non-cash food consumption. In addition, it collected information on in-kind remittances as well as cash remittances. In both cases, the respondents were asked to estimate the value of the consumption or the gift. Although this is not ideal, this is a common way to value such goods.

All models in this study make use of asset indexes. Each of the three data sets collect information on ownership of assets of different assets. The IHS98 asks respondents to estimate the amount they would receive if they were to sell each asset today. This allows for the construction of variables indicating the value of fixed and variable assets.

The FTP and CPS however collect data on asset ownership, but do not place any value on assets. One possibility would be use place each asset in the regression as a dummy variable indicating ownership or not of an item, as a continuous variable (how many cattle?), or as a categorical variable (quality of housing on a 3 point scale). An alternative is to use Principle Components Analysis (PCA) in order to generate an asset index.

The aim of PCA is to create a standard normally distributed index for the whole sample. The index value for each household is the variable to be estimated such that:

Household Index Value = $a_1 + a_2$ Asset 1 + a_3 Asset 2 + ... + error

Note that coefficients of a_i=1 results in an identical index to that created if each asset is simply added up. However, it is useful to weight each asset since, for example, it might not be desirable to have ownership of one chicken to be the same as the ownership of one cow. The a_i gives these weights.

The method focuses on the covariances amongst the assets and aims to maximise the proportion of the common and unique variance which is explained by the index. However, it is unlikely that in one single index, one hundred per cent of the variances will be explained (that is, it is unlikely that the error will be zero). Thus, several indexes are actually estimated in each case, and the index used is the index which explains the greatest part of the variance and covariance of the assets included. In all cases, the asset index used explains between 50 and 60 per cent of the variance and covariance of the assets included.

Details of the exact assets included are given below Table 3.1 for the FTP and in footnote 21 for the CPS.

3.2 MALAWI FAMILY TRANSFER PROJECT

Chapter 5 studies motivations to remit using individual level data. This data set was chosen because the theory necessitates information on both sender and receiver characteristics. In addition, this data set allows this study to extend the existing research by analysing whether and how the relationship between the sender and the receiver matters in motivating remittances.

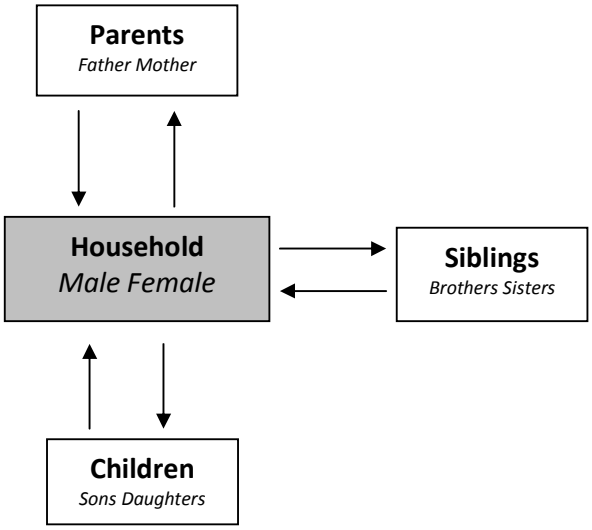
The Malawi Family Transfers Project (FTP) was carried out in three rural areas of Malawi (Balaka in the southern region, Mchinji in the centre and Rumphi in the north) between June and August, 1999. The three areas in which the survey was conducted are both similar and broadly representative of rural areas in Malawi in socioeconomic terms and with regards to commercial activities (markets, banks,…) and institutions (post offices, clinics,…) (Weinreb, 2001; 2002).

The data were collected by the University of Pennsylvania Population Studies Center (Social Networks) for the purpose of analysing gifts and remittance flows from a number of different perspectives. There are 616 females and 501 males in the main households surveyed. There are more females due to lower response rates amongst males, polygamy and absence. The sampling purposively targeted working-age households and made efforts to interview both the household head and his wife. Males and females reported remittances sent and received on an individual (not household) level. Figure 3.1 gives the potential transfer relationships.

Figure 3.1: Potential remittance flows

3.2.1 Characteristics

There are 1145 potential remittance flows between the male or female and their parents; 522 between the male or female and their children, and 3945 with siblings. Remittance flows are studied for all relationships described separately, and only for adult relations who do not reside in the same household as the respondent, explaining the small number of



children. Thus Chapter 5 analyses remittance flows that are *inter*-household but *intra*-family. The average age of respondents was around 33 years with males being on average around six years older than females. Almost all respondents are married and respondents have 3.7 years of education on average. Interestingly, there is little difference between males and females in this respect. (Amongst their parents however, only around 50 per cent of mothers had any education compared with over 80 per cent of fathers, showing

key generational difference.) Self-reported health status was, on average over 8/10 although 28 per cent of respondents reported having suffered from ill health during the previous month. Average weekly wage income was over MK300 for men compared with around MK100 for females, and on average, men had a far higher asset index score. In addition, many respondents reported looking after the children of the relatives with whom they have transfer relationships.

Table 3.1: Respondents' characteristics

	Obs	Mean	Std. Dev.	Min	Max
Age	1010	33.29	10.64	1	73
Years education	1131	3.71	3.32	0	14
Married	1166	97.00%		0	1
Female respondent	1166	55.06%		0	1
Eldest child	1166	19.47%		0	1
Health rating (1=lowest to 10=highest)	1165	8.14	1.94	1	10
Health problem in last month	1166	28.22%		0	1
Wage income last week (MK)	1117	222.33	1087.00	0	20000
Asset index *	1117	0.00	1.73	-2.08	11.79
Sibling in house	1166	6.35%		0	1
Nephew/Niece in house	1166	12.18%		0	1
Grandchild in house	1166	9.35%		0	1
Matrilineal ethnicity	1166	23.76%		0	1
Patrilineal ethnicity	1166	37.14%		0	1
Mixed (Chewa) ethnicity	1166	39.11%		0	1

*Notes: *Created using Principle Components Analysis and includes ownership of bed, radio, bike, lamps, pit latrines, cattle, goats, pigs, poultry, land and quality of housing material. The mean of the asset index is around zero by construction[17].*

On average, parents are 60 years of age (fathers 64 years and mothers 57 years), and respondents rated their parents' health at around 6.2/10 on average (with little difference between fathers and mothers). Parents had an average of 7.9 heirs, and 66 per cent of them reported having some schooling (54 per cent of mothers and 82 per cent of fathers). Over a third of parents live in the same village as the interviewed child. Nearly seven per cent of respondents reported looking after a sibling.

Table 3.2: Parents' characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age Parents	1144	60.09	11.88	32	99
Health Parents	1139	6.23	2.35	1	10
Heirs	1147	7.89	2.74	1	20
Sibling in respondent's house	1147	6.80%		0	1
Schooling	1147	66.17%		0	1
Parent lives in same village as respondent	962	37.63%		0	1

[17] Lawley and Maxwell (1963) give a clear discussion of Principle Components Analysis.

Since working age respondents were purposively targeted, and these data are used to analyse only *inter*-household remittances, very few respondents had adult children living outside of the family home. There are thus only 522 potential dyads, or remittance relationships between respondents and their children.

The average reported health level of the children was around 8.4/10, and children were on average around 23 years of age. There are more daughters than sons, probably due to daughters leaving the home to marry at a younger age than sons, indeed on average daughters were younger than sons. Around two thirds of children were married, and 27 per cent had moved to a city or abroad. Respondents reported having an average of 4.4 children, and receive remittances from an average of 1.35 of these. Over 17 per cent of respondents reported having a grandchild in their household but the data do not indicate to which child the grandchild belongs.

Table 3.3: Children's characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
Health of son/daughter (1=lowest, 10=highest)	522	8.43	1.78	1	10
Number of children parents have	522	4.38	1.89	1	11
Number of sons/daughters remitting to parents	522	1.35	1.36	0	5
Age of son/daughter	522	22.94	5.76	15	63
Eldest son/daughter	522	45.02%		0	1
Parents have one of children's children in household	522	17.43%		0	1
Daughter (not son)	522	59.77%		0	1
Son/Daughter lives in city or abroad	522	27.01%		0	1
Son/Daughter married	522	64.56%		0	1

Respondents' siblings are on average around 31.8 years and respondents rated their health at 8.14 on average. Around half of siblings are sisters and half brothers. Nearly a quarter of all siblings live either abroad or in a city inside Malawi, with this being the major difference between respondents and their siblings. In nearly 13 per cent of cases, the respondents reported looking after a sibling's child. Again, unfortunately the data do not indicate to which sibling the child belongs.

Table 3.4: Siblings' characteristics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age of sibling	2916	31.78	11.49	15	96
Health of sibling	3945	8.14	1.95	1	10
Sister	3945	50.37%		0	1
Eldest sibling	3945	12.19%		0	1
Sibling lives abroad or in city	3945	24.41%		0	1
Respondent household has nephew/niece	3945	12.75%		0	1

3.2.2 Remittance flows

Although both husbands and wives were interviewed in the majority of cases, respondents reported remittances sent and received on an individual bases. Thus, remittances sent from the male to a son is not the same as that sent from the female to the same son. Respondents reported remittances sent and received since the end of the previous growing season – a period of around four to five months. Detailed information is given regarding the remittances, and estimated values of goods (collected in the field) are used to value physical (as opposed to cash) gifts.

There are 1145 potential remittance dyads between the respondents and their parents. Of these, respondents reported remitting to parents since the last agricultural season in around 65 per cent of cases, and received remittances from parents in 50 per cent of cases. Excluding zero remittance flows, the average remittances sent to parents was MK245 and the average value of remittances received from parents was MK205. (MK is Malawi Kwacha, the local currency unit. At the time of the survey US$1 ≈ MK70.)

Between respondents and children there are 522 potential remittance relationships with respondents giving to children in just over half of all cases an average amount of MK300, and receiving remittances from children in around 38 per cent of cases with the average amount received being around MK200.

Respondents reported remitting to siblings in 35 per cent of the 3945 potential cases, and received from them in around a quarter of cases. Average remittances sent and received are similar at around MK185.

It is possible that there is some degree of reporting bias since more respondents reported giving than receiving in all cases. However, due to sampling, this seems realistic in the case of parents and children. It is perhaps less likely with regard to siblings, and it is

interesting to note that there is little difference in the value of remittances sent and received in this case, and the gap between the number of respondents reporting sending and receiving remittances is smaller for siblings than for parents and children.

Table 3.5: Incidence and values of remittance flows

	Obs	Mean	Std. Dev.	Min	Max
Respondent <--> Parents					
Respondent--> Parent	1145	64.37%			
Parent--> Respondent	1145	50.57%			
Value of remittances to parent (excl. zeros)	737	244.57	435.6	1	5000
Value of remittances from parent (excl. zeros)	579	205.13	489.84	5	6350
Respondent <--> Children					
Respondent -->Children	522	51.72%		0	1
Children--> Household	522	37.74%		0	1
Value of remittances to children (excl. zeros)	275	300.24	455.16	4	4000
Value of remittances from children (excl. zeros)	198	200.82	420.65	4	5000
Respondent <--> Siblings					
Respondent --> Sibling	3945	35.18%			
Sibling --> Respondent	3945	26.84%			
Value of remittances to sibling (excl. zeros)	1389	180.03	418.73	1	7503
Value of remittances from sibling (excl. zeros)	1061	188.4	572.3	2	15000

3.3 MALAWI INTEGRATED HOUSEHOLD SURVEY

Chapter 6 uses a large cross-sectional data set to test for the existence of mental accounting, a psychological theory that postulates that income from different sources is used differently. The focus is on testing the theory and then estimating the uses of remittances in particular. The Malawian Integrated Household Survey was carried out from November 1997 to October 1998. Urban households and those judged by the Malawian National Statistical Office to have unreliable income and consumption data were dropped to leave a representative sample of 5644 rural households across Malawi. This large sample data set includes detailed income and consumption variables as well as a wide range of household characteristics. For these reasons, these data are used rather than the short panel, discussed in 3.4 and used in Chapter 7, to study consumption habits, and significant efforts are made to minimise the risk of unobserved heterogeneity. Apart from urban-rural differences, one key source of potential unobserved heterogeneity results from intra-household bargaining. That is, the person controlling the remittance income has different preferences to other members of the household. In particular remittance income may accrue to females from husbands working away from home. For this reason, the analysis in Chapter 6, and the descriptive information given here are broken down by male and (de facto) female heads of household.

3.3.1 Household characteristics

The average male household head is around 40 years of age and has 4.5 members of which 2 are children. Female heads comprise of around 26 per cent of the total and tend to be older with an average age of 44 years. The average household size is smaller that their male counterparts at 3.8 members and 1.9 children. Nearly 90 per cent of male heads are married compared with 28 per cent of female household heads. The smaller household size for female headed households (FHH) thus appears to be explained partly by the lack of husband and partly by the lack of children. Female headed households could be split into several groups: some females are likely never to have been married, reducing the number of likely children. Others will be divorced or widowed, perhaps with some children living outside of the household. Those who are still married are likely to have husbands working away from the home. These are therefore considered de facto household heads.

Half of FHH and 43 per cent of male headed households (MHH) reported working in agriculture. There is no difference in acres of land owned between MHH and FHH, with each group owning on average 1.85 acres. This should not be surprising, as a large proportion of the Malawian population follows matrilineal or mixed customs whereby land is inherited through females. Section 1.3 gives more detail regarding the Malawian context.

Education is given by a discrete variable from zero to six where zero is illiterate, one is literate but has no formal education, two indicates some primary education, three indicates having completed primary education, four indicates some secondary education, five indicates having completed secondary education and six is further or higher education. The average value is 2.24/6 for male heads and 2.03 for female heads.

Around a quarter of all households were interviewed during the "hungry season" between December and February inclusively. This is the time period before the harvest during which food is scarce, and this "season" can have an impact on household behaviour. A dummy controlling for this season is therefore included where necessary.

Around 15 per cent of households reside in the largely patrilineal north and 44 per cent reside in the matrilineal and mixed south. The remainder live in the central (capital) region of the country, which has mixed matrilineal/patrilineal customs.

3.3.2 Income

All income and consumption values were annualised, placed in per adult equivalent (PAE) terms and adjusted for the regional price level. The survey was carried out from November 1997 to October 1998 during which time the country experienced a relatively high inflation rate; International Financial Statistics show an inflation rate of 29.75 per cent during 1998. During the survey, information was collected on local prices in each of the regions where the survey was carried out. This information was then used to construct monthly food, non-food and total price indexes for each region. These price indexes correspond more closely to the purchases of the households surveyed and are more detailed than the inflation data collected by the Reserve Bank of Malawi. All monetary values are adjusted according to the time the household was surveyed and the region in which they are situated.

Average reported non-business PAE household income is Malawian Kwacha[18] (MK) 1866 annually with average consumption equal to MK2063. Average non-business income is higher in FHH than MHH, but consumption is higher in MHH than FHH. Income sources are varied with many households receiving income from several sources and the percentage of households receiving income from any given source is similar for MHH and FHH. Around 19 per cent of households reported accessing credit during the previous year. 22 per cent had business income, 46 per cent received farm income and 20 percent received salary income. For those that receive it, salary income is the most important source of income in terms of average value.

Around 22 per cent of households reported receiving remittance income during the month preceding the survey. The mean yearly income from this source was MK1409 for those that received them. Excluding business income, mean remittances are worth around 43 per cent of the average total income of receiving households. They are thus an important source of income for these households. For those that receive remittances income, it is worth an average of MK1440 for MHH and MK1605 for FHH. This may be the result of geographically split households in which the husband works away from home and remits income to the de facto female head.

3.3.3 Consumption

Consumption is classified into food; education; health; farm; household (e.g. personal and household hygiene, communication, transport); clothing; and fuel categories as well as total non-durable consumption. The kwacha value of consumption of each category is presented, and values are similar for both MHH and FHH for all categories.

In addition, many households also reported significant non-cash consumption (largely home produce) with this being equal to around 68 per cent of non-business income. This should not come as a surprise in an agricultural economy such as Malawi's where many households produce a large proportion of their own food consumption. The analysis in Chapter 6 however, focuses on easily fungible cash income and consumption.

3.3.4 Asset holdings

Respondents were asked to list their assets and to estimate the value of them by indicating how much they would receive for them if they were to sell them today. Fixed

[18] During the period of the survey US$1≈MK70. Note that only rural households are analysed where the price level is typically around one third that of urban areas.

assets include land and housing, and liquid assets include livestock and items such as bicycles and household appliances. The average value of fixed assets was MK2119 or 114 per cent of average non-business yearly income. FHH actually reported owning assets totalling slightly more than MHH for both fixed and liquid assets. This is potentially due to the fact that Malawi as a whole is biased towards matrilineal systems with females owning more than males.

Table 3.6: Selected descriptive statistics from Integrated Household Survey

	Male Headed Households					Female Headed Households				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Household Characteristics										
Age	4171	40.10	14.91	16.00	114.00	1473	44.28	16.66	14.00	99.00
Married	4171	0.89		0.00	1.00	1473	0.28	0.45	0.00	1.00
Household Size	4171	4.45	2.34	1.00	18.00	1473	3.79	2.20	1.00	16.00
Number of Children	4171	2.01	1.76	0.00	12.00	1473	1.93	1.63	0.00	9.00
Education Level (0-6)	4038	2.24	1.55	0.00	6.00	1435	2.03	1.49	0.00	6.00
Agricultural Employment	4171	0.43		0.00	1.00	1473	0.50		0.00	1.00
Acres Owned	4171	1.85	1.79	0.00	32.00	1473	1.86	1.78	0.00	23.20
Interviewed during Hungry Season	4171	0.25		0.00	1.00	1473	0.26		0.00	1.00
Reside in North	4171	0.14		0.00	1.00	1473	0.16		0.00	1.00
Reside in South	4171	0.45		0.00	1.00	1473	0.41		0.00	1.00
Income (all Kwacha values annualised and spatially deflated per adult equivalent)										
Total	2923	1816.63	3619.80	3.43	70677.34	1049	2004.24	4108.73	2.44	72726.00
Salary	843	3027.21	3482.08	3.18	52864.08	260	3242.44	3303.84	17.69	16511.45
Remittance	924	1339.78	4049.11	1.99	69600.00	326	1604.68	3155.84	6.12	22344.00
Farm	1927	410.30	740.08	2.60	15395.47	680	453.88	843.66	2.44	8850.00
Credit Income (Yes/No)	4171	0.19		0.00	1.00	1473	0.18		0.00	1.00
Business Income (Yes/No)	4171	0.22		0.00	1.00	1473	0.22		0.00	1.00
Farm Income (Yes/No)	4171	0.46		0.00	1.00	1473	0.46		0.00	1.00
Salary Income (Yes/No)	4171	0.20		0.00	1.00	1473	0.18		0.00	1.00
Remittance Income (Yes/No)	4170	0.22		0.00	1.00	1473	0.22		0.00	1.00
Consumption (all Kwacha values annualised and spatially deflated per adult equivalent)										
Total	4171	2080.58	2871.11	18.72	72894.28	1473	2012.74	2430.67	35.58	35443.14
Food	4153	917.96	1037.42	1.61	17043.05	1468	884.06	993.99	2.70	10696.58
Education	410	277.76	572.74	0.53	6150.00	126	304.23	854.13	0.57	6150.00
Health	2514	66.06	141.21	0.25	2440.00	913	56.33	101.06	0.26	1382.40
Household	4171	1646.58	2126.15	10.95	36966.28	1472	1575.32	1730.27	17.16	16559.68
Farm	2260	224.83	312.15	0.43	4770.00	818	258.37	576.93	1.28	9721.32
Clothing	2907	439.81	771.02	0.69	21924.00	1039	439.86	654.61	0.46	8954.80
Fuel	3622	128.70	674.52	1.85	25760.00	1284	110.04	372.58	1.76	10546.20
Assets (all Kwacha values spatially deflated per adult equivalent)										
Fixed	3970	2095.758	5163.823	7.513262	103455	1398	2184.09	5543.28	22.95	125000.00
Liquid	4105	905.4355	3683.543	1.608579	113830.9	1447	958.29	3846.26	2.94	113522.70

3.4 MALAWI COMPLEMENTARY PANEL SURVEY

Chapter 7 uses the Malawian Complimentary Panel Survey (CPS) to help understand whether remittances can help to moderate the impact of shocks such as sickness or drought. This chapter requires panel data in order the test the theories which are largely based on changes in consumption levels following shocks. In addition, this data set provides information on idiosyncratic shocks faced by the households. The larger sample size of the IHS98 is therefore sacrificed to ensure sufficient information.

The CPS was undertaken by the Center for Social Research (CSR) in Malawi with technical assistance from the International Food Policy Research Institute (IFPRI) between January 2000 and July 2002. Four rounds of interviews were conducted yielding an unbalanced panel of 2550 observations. This study focuses on the 2355 rural households since urban households are likely to have access to different, additional means of income smoothing. Banking services are prevalent in urban areas, and employers often provide basic credit and saving services for their employees. The Malawian urban economy, although strongly linked to the rural, agricultural economy is vastly different in employment and industrial structure, and food is readily available in urban areas, even during times of scarcity in rural areas.

Malawi's history of migration combined with its lack of formal rural financial infrastructure means that remittances have developed as an important means of minimising risk and are thus an important source of both income and expenditure for households. This is the case for both intra-family and inter-household transfers. This data set indicates that remittances make up around 10 per cent of rural total income for households which also send them. Traditional gift exchange is an important part of rural life in Malawi, helping to smooth consumption and decrease risk faced with the lack of accessible financial infrastructure. This makes Malawi an ideal setting to study remittance flows from an insurance perspective.

Descriptive statistics reveal informative differences between households which remit and those which do not, and between households which receive remittances and those which do not. In particular, the data reveal that senders and receivers exhibit very similar characteristics which tend to be different from the wider population. In the discussion that follows, the data are based on initial conditions, that is, the data collected during the

first round of the survey, and the characteristics used as control variables in the empirical analysis[19].

One outstanding result is that remitters are more likely to receive remittances themselves, and receivers are more likely to remit than the total sample. 44 per cent of receivers also remit against 31 per cent of the total sample, and 38 per cent of senders also receive remittances against 31 per cent of the total sample. Remittances flow in both directions suggesting that there is a strong insurance motive for these flows. It is unfortunate that, unlike in the Malawi Family Transfer Project data, sending and receiving households are not matched making it difficult to tell if two households engage regularly in mutual gift exchange.

Sending and receiving household heads tend to have better education (4.56 and 5.36 years respectively) than the average of 4.11 years. Furthermore senders and receivers are more likely to be better connected than other households. 24 per cent of sending household heads and 21 per cent of receiving household heads reported belonging to a local business group[20] compared with around 14 per cent for households that neither send nor receive remittances. 51 per cent of sending household heads and 55 per cent of receiving household heads reported belonging to a religious group compared with 47 per cent percent of the whole sample. Senders and receivers also tend to be slightly more involved in political groups (local parties) and social groups (such as sports or acting clubs or women's groups).

These results should not be surprising. It could be that these groups offer a secure environment within which gift exchange can be carried out. Membership of a religious organisation might encourage trust for example. Furthermore, gift exchange within the context of a club might increase the social penalties associated with non-reciprocation, helping to increase security.

A further reason why households which participate in remittance flows tend to be better connected than other households may relate to social and economic standing. Members of business clubs may have higher or more secure income, and receive gifts from others

[19] This is done to avoid endogeneity issues regarding household characteristics and due to data limitations (information on some variables was collected only during the first round).
[20] Local business groups are primarily farmers' clubs, or talking shops for shop-keepers or maize traders.

because they are seen as good people to have in a social network in times of difficulty. Other desirable groups to have in one's social network are those with salaried jobs. Senders and receivers are both more likely to have a household member with a salaried job. The causality in these examples is likely to go both ways. Those with better jobs or steadier income are more likely to be able to remit and would tend to be amongst the "best" people to have in a social network ensuring they also receive remittances.

It is notable that senders and receivers have significantly higher asset scores for both livestock and non livestock indexes[21] and higher food and non food consumption levels than other households. In short, sending and receiving households are wealthier than the average.

[21] Assets used in the factor analysis include ownership of livestock, ownership of household furniture (e.g. tables, bed, chairs), household appliances and similar (e.g. radio, cooker, bicycle), and variables indicating quality of home (quality of walls, roofing, floor), access to electricity and water and number of hectares of land owned by the household. The asset index takes an average value of zero for the full sample (including urban households) and is normally distributed.

Table 3.7: Selected descriptive statistics from Complementary Panel Survey

	Full Sample			Remittance Receivers			Non-Receivers			Remittance Senders			Non-Senders		
Variable	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Age of Household Head	627	46.35	16.31	164	45.91	15.18	463	46.51	16.70	194	42.16	14.82	433	48.23	16.61
Education of Head (Years)	687	4.11	3.53	184	4.56	3.66	503	3.94	3.47	212	5.36	3.62	475	3.55	3.35
Female Household Head	687	0.25	-	184	0.27	-	503	0.24	-	212	0.16	-	475	0.29	
Household Size	687	5.75	2.52	184	5.89	2.76	503	5.69	2.42	212	6.19	2.61	475	5.55	2.45
Head Married	683	0.75	-	183	0.70	-	500	0.76	-	211	0.82	0.38	472	0.71	-
Any Member Accessed Credit in Previous 12 months	687	0.14	-	184	0.15	-	503	0.13	-	212	0.21	0.41	475	0.10	-
Any Member with Salaried Job	687	0.13	-	184	0.16	-	503	0.11	-	212	0.17	0.37	475	0.11	-
Head Member of Business Group	687	0.16	-	184	0.21	-	503	0.15	-	212	0.24	0.43	475	0.13	-
Head Member of Religious Group	687	0.47	-	184	0.55	-	503	0.44	-	212	0.51	0.50	475	0.45	-
Head Member of Political Group	687	0.11	-	184	0.11	-	503	0.11	-	212	0.17	0.38	475	0.08	-
Head Member of Social Group	687	0.28	-	184	0.30	-	503	0.28	-	212	0.31	0.46	475	0.27	-
Remittance Sending Dummy	687	0.31	-	184	0.44	-	503	0.26	-	-	-	-	-	-	-
Remittance Receiving Dummy	687	0.31	-	-	-	-	-	-	-	212	0.38	0.49	475	0.22	0.41
Asset Index: Non Livestock	616	-0.15	0.67	168	-0.10	0.59	448	-0.17	0.69	190	0.02	0.86	426	-0.23	0.54
Asset Index: Livestock	616	0.02	0.71	168	0.10	0.70	448	-0.01	0.72	190	0.12	0.74	426	-0.03	0.70
Monthly Per Capita Income before Remittances (MK)	687	2961	14059	184	2363	4320	503	3180	16221	212	6048	24116	475	1583	4584
Remittances as per cent of total monthly income	542	0.09	0.27	184	0.26	0.41	-	-	-	193.00	0.10	0.28	349	0.09	0.26
Monthly Per Capita Food Consumption	687	414	1062	184	534	1688	503	370	704	212	628	1630	475	319	648
Monthly Per Capita Non-Food Consumption	687	900	4347	184	943	3008	503	885	4746	212	1844	7055	475	479	2148
Monthly Per Capita Total Consumption	687	1314	4608	184	1477	3780	503	1255	4879	212	2471	7457	475	798	2263

Households reported the geographical sources of their remittance income over the month previous to the survey. Over a third of rural households reported receiving remittances, with more cases of remittances coming from local areas (village and home district) than distant places (other districts, urban areas and abroad).

Table 3.8: Percentage of households receiving remittances from different sources

Receive Remittance From:	Obs	Mean
Village	2355	18.3%
District	2355	11.2%
Other District	2355	7.7%
Urban Area	2355	1.9%
Abroad	2355	1.1%
Local*	2355	26.8%
Distant†	2355	10.6%
Total	2355	34.6%

*Notes: *composed of village and district remittances; † composed of remittances from other districts, urban areas and abroad.*

Households also reported recent shocks. In particular, they reported whether a household member and which member had suffered from a health shock during the previous two weeks[22]. Secondly, in cases in which a household member had left since the previous round, they reported the reason for their absence allowing for the construction a dummy variable indicating whether or not a household had suffered from a recent death. Drought and Flood indicator variables were constructed using reports from Famine Early Warning System Network[23] reports from Malawi, and are equal to 1 if a household lives in an area which suffered from a flood or drought since the previous round, and 0 otherwise[24]. Thus, there are two idiosyncratic or household shocks (death and sickness) and two community or covariant shocks (flood and drought)[25]. Table 3.9 reports that around three per cent of households reported suffering from a death; nearly two per cent suffered from drought, and around 6.5 per cent from flooding. Over half of

[22] Unfortunately, it is not possible to know the severity of the health shock. In addition, since these are self-reported health shocks, there is a risk of measurement error (potentially correlated with education). This is an unavoidable issue, but efforts are made to correct for this by controlling for household characteristics and ensuring results are robust to fixed effects (see discussion in Chapter 7).

[23] Reports available at: http://www.fews.net/malawi/

[24] Floods and droughts are only considered shocks if they happened during a relevant season, so for example, no rain during the dry season is not considered to be a drought.

[25] Recall periods for death were since the previous round, floods and droughts are indicated as having occurred since the previous round up until 1 month prior to the survey, sickness is reported during the previous two weeks, and the recall period for remittances is one month. There is thus the potential for a short overlap period for remittance receipts and death, and for sickness and remittances. Unfortunately for sickness it is not possible to know which came first within the context of the data used. Nonetheless, the results remain of interest.

all households suffered from a health shock. This study will focus separately on health shocks, analysing separately male and female members, and adults and children.

Remittance receivers are more likely to have suffered from the two idiosyncratic shocks analysed (health shocks, and death), whilst remittance receivers are less likely to have suffered from the covariant shocks, flooding and drought.

Table 3.9: Percentage of households suffering from shocks

Variable	Total Sample		Remittance Receivers		Non Receivers	
	Obs	Mean	Obs	Mean	Obs	Mean
Health	2355	54.0%	816	56.7%	1539	52.5%
Death	2355	3.3%	816	4.0%	1539	2.9%
Flood	2355	6.5%	816	5.3%	1539	7.1%
Drought	2355	1.7%	816	1.6%	1539	1.8%

Table 3.10 shows simple correlations between shocks and remittances received from local areas, and more distant areas in both value and indicative terms. Idiosyncratic shocks are associated with increased likelihood of receiving local remittances and increased value of local remittances, and are significant for value received. Covariant shocks and receipt of local remittances are negatively associated and are significant in three out of the four cases. These relationships are unsurprising. Local remittances are likely to increase following idiosyncratic shocks if there is some degree of insurance or altruism in remittance giving. That remittances decrease from local areas following covariant, community shocks such as flooding and droughts is, likewise, to be expected. Most local households would have been affected, and potential givers would therefore find it more difficult to give remittances.

Where significant, covariant shocks are positively associated with remittances from further afield, whilst there are conflicting signs and no significant correlations between idiosyncratic shocks and remittances received from distant places. Neither of these results should be surprising. Covariant shocks such as flooding and droughts are difficult to insure close to home, but remittances from unaffected areas can help to ease the impact of these shocks. Theoretically, one might anticipate that remittances from far away can ease the impact of idiosyncratic shocks as well as those from closer to home, with distant relatives as well as neighbours assisting households which suffer from these shocks. However, as noted by Posner (1980), it is reasonable to assume that, at least in the case of health shocks, the problem of information asymmetry is reduced closer to

home. This would encourage local insurance of such shocks. Secondly, where a shock requires immediate expenditure such as medical expenditure or on funerals, local insurance is preferable in economies with little formal financial infrastructure, and where travel is difficult[26].

Table 3.10: Correlations between shocks and remittance receipts

	Shock			
	Health	**Death**	**Flood**	**Drought**
Local Remittances (Dummy)	0.0308	0.0237	-0.0455*	-0.0364*
Distant Remittances (Dummy)	0.0294	0.0067	-0.0060	0.0493*
Local Remittances (Value)	0.0355*	0.0341*	-0.0408*	-0.0251
Distant Remittances (Value)	-0.0235	-0.0021	0.0788*	-0.0034

*Notes: * indicates significance at the 10% level*

3.5 A COMPARISON OF THE DATA SETS

Average education levels for males in the IHS98 is 2.24 out of a possible six, compared with 2.03 for females. There is thus a clear difference between males and females. The FTP however indicates that educational differences between males and females are zero. Both the CPS and the FTP report years of education. The average in the CPS is 4.11 years, compared with 3.71 yeas in the FTP. This is surprising since it is likely that the purposive sampling of working age adults in the FTP (therefore largely excluding the elderly) is likely to result in a better educated sample.

Other differences between the IHS98 and the FTP are the result of purposive sampling in the FTP. For example, the average age of respondents in the FTP is around 33 years, compared with over 40 years in the IHS98. In addition, 97 per cent of FTP respondents were married compared with around 73 per cent in the IHS98. The FTP deliberately targeted working aged adults rather than a representative sample of the rural population. For this reason, respondents are, on average, younger, and more likely to be married.

Although the FTP and the IHS98 were conducted at a similar time (IHS98 in 1998 and FTP in 1999) the value of remittances are difficult to compare. Firstly, the FTP reports individual receipts, whilst the IHS98 reports household receipts. Secondly, the recall period is one month for the IHS98, but several months for the FTP. Finally, and most importantly, the FTP reports the value of remittances received from family members

[26] This might be expected to change, as it is becoming increasingly easy to transfer funds using mobile phone credit, even in rural areas.

specified only, whilst the IHS98 reports value of remittance receipts from all people, including friends and neighbours. The CPS indicates that remittances from non family members are likely to be important.

The average age of household heads is around 46 years in the CPS, compared with around 41 years in the IHS98. In both surveys around a quarter of households are headed by females, and a similar proportion is married. The average household size is 5.75 in the CPS but around 4.3 in the IHS98. These similarities and differences are likely to be the result of sampling and the larger sample of the IHS98 is likely to be more representative of the rural Malawian population.

Each of the data sets has a number of advantages and disadvantages. Although each one has been selected for the purpose, there remain issues. The two cross-sectional data sets have one major, but obvious disadvantage – they are not panel data. Although every effort has been taken to minimise the risk, it is not possible to be certain that individual heterogeneity does not impact on any of the results. For example, when studying mental accounting, it would be ideal to know that an individual changes their behaviour when their income composition changes, rather than simply that individuals with different income compositions have different consumption habits.

Panel data has its own intrinsic (given issues involved in collecting data) issues. One major issue is that of sample attrition. The first round interviewed 758 households, although key data was collected for only 687 of these. The second round interviewed 667 households, the third round, 631, and the fourth round interviewed 499 households. Thus, around 73 per cent of households interviewed during the first round were also interviewed during the final round. This however disguises the fact that a number of households were came back in later rounds after having dropped out. For example, 25 households were not interviewed during the second round, but were interviewed during the third round. For these households it remains possible to focus on differences in consumption levels between the two (or more) rounds in which they were interviewed. This minimises the impact of the sample attrition. Nonetheless, the low sample size in round 4 is potentially an issue. Analysis suggests that this is largely due to issues collecting the data and not largely due to the characteristics of the households that were not interviewed during the final round. For example, household asset index scores (which were collected only during

the first round) are not significantly different for households surveyed during the fourth round compared with that for all households. For these reasons, no adjustments have been made for the fourth round sample. However, this could be regarded as a weakness in the panel data.

The other disadvantage of the panel data set used lies in the collection of the data on shocks. It did not, for example, collect data on community level shocks. This information has been added to the data set from an outside source, and all households in the regions that suffered are assumed to have been effected. Secondly, the time period for data collected on sickness and death does not match exactly that for consumption, meaning that any impact of these shocks on consumption (change) is likely to be at least partly a lagged impact.

3.6 CONCLUSION

This chapter has elucidated key aspects of the data used in each empirical chapter. The motivations for using each data set are provided and descriptive statistics of relevant variables are provided and discussed. Any adjustments made, for example, for prices are noted, and the unique and relevant aspects of each data set are exploited to provide a wider picture of the empirical context. Finally, attention is draws to several differences between the data sets.

4 METHODOLOGY

4.1 INTRODUCTION

This chapter presents the econometric methodologies used in this thesis. Each section discusses the major ideas behind each concept, before focussing on points most relevant to the study undertaken. In particular, it aims to show why particular econometric techniques have been used, and, at times, why certain techniques are not used. Thus as well as providing an overview of the methods used, it justifies the econometric methods chosen.

Chapter 7 presents a number of econometric issues and their resolutions or robustness tests specifically relevant to that chapter. These are explained in the chapter itself in order to ensure that the "flow" of the thesis is maintained, and that the discussions are in their most suitable context. This chapter presents the technical elements of the econometrics used, and some of the arguments for the choice of the basic models used.

4.2 ORDINARY LEAST SQUARES

Ordinary Least Squares (OLS) regressions are used in chapters 5 and 7. Chapter 5 uses OLS to understand the factors which contribute to the value of the net remittances an individual receives from each three of different relative groups. The aim is to make some attempt to understand the motivations for remitting. Chapter 7 uses OLS to estimate pooled panel models (and various robustness tests) for the impact of shocks on per capita consumption growth for households.

This section briefly sketches the main hypotheses of OLS including any corrections made for (potential) violation of these with a focus on correcting "clustering" of standard errors, an important issue in chapters 5 and 7.

(1) Linearity.

As indicated above, there should be a linear relationship between the dependent variable and the explanatory variables. Certain non linearities can be accommodated through simple adjustments to the model however. For example, in all empirical chapters in this

thesis, both age and its square are used as regressors. This allows for the possibility for a quadratic relationship between age and the dependent variable.

(2) Exogeneity.

The expected value of the error term, conditional on the regressors is zero for all observations.

$$E(\varepsilon_i \mid X) = 0 \qquad (i=1,2,3,\ldots,N) \qquad \textbf{(4.1)}$$

Several implications follow from this assumption. Firstly, through the Law of Total Expectations[27], the unconditional mean of the error term is also zero:

$$E(\varepsilon_i) = 0 \qquad \textbf{(4.2)}$$

Secondly, the error terms are orthogonal to the covariates for all observations:

$$E(x_{jk}\varepsilon_i) = 0 \qquad (i,j=1,2,3,\ldots,N;\ k=1,2,3\ldots,K) \qquad \textbf{(4.3)}$$

Alternatively stated, the distribution of the error term does not depend on the covariates.

This condition is likely to be violated in one of two circumstances. Firstly in the case of missing variables where no proxy is available, the impact of the omitted variable will go into the error term. If however, the omitted variable is correlated with an included regressor, then the error term will be correlated with a regressor. An oft-used example is in equations estimating wages as a function of education and ability (Mincer equations). Since it is difficult to observe ability, and proxies are not always available, the impact of this variable goes into the error term. However, ability is likely to be somewhat correlated with the included education variable.

Secondly, this assumption is violated if the dependent variable is simultaneously determined with a regressor, as is potentially the case in an extension to Chapter 7 where, it is argued, current health shocks are potentially determined simultaneously with current consumption levels. In this case instrumental variables (IV) can be used to correct for the simultaneity. This is discussed below as a correction.

[27] The Law of Total Expectations is given by: $E[E(y|x)]=E(y)$.

(3) No (perfect) multicollinearity.

Perfect multicolinearity exists if one explanatory variable is exactly linearly related to other explanatory variables. In this case, the model becomes unestimateable, and one variable will have to be dropped.

This is particularly an issue for dummy variables. For example, in all chapters regional control variables are included for the three main Malawian regions (North, Centre, South). In each case one of these has to be dropped since any one of these is exactly linearly related to the others. The coefficients on the included dummies are then interpreted in relation to the excluded, or baseline, variable. In Table 6.1 the excluded region is the Central region, and the North dummy exhibits a positive and significant coefficient for male headed households, whilst the South dummy is not significantly different from zero. This is interpreted as evidence that, other things being equal, northern households have a higher per adult equivalent consumption than their central counterparts, whilst their central and southern counterparts do not differ significantly, on average.

Imperfect multicollinearity deserves some discussion. In this case, regressors are not perfectly correlated, but are highly intercorrelated. Some degree of intercorrelation amongst explanatory variables is to be expected, but high correlation can be an issue in smaller samples.

A high degree of correlation between explanatory variables can mean that results are particularly sensitive to deletion of variables. This is likely to be the case where included variables are actually acting as a proxy for a third, unincluded variable, possibly unbeknownst to the OLS user. For example, in a study on house prices, “distance from the house to a main road” and “distance to the nearest bus stop” might be included as regressors. If these are both proxying for “remoteness of the house”, and are highly correlated, both might produce high standard errors (low t-values), and become insignificant, whilst including only one of them renders that variable significant. Including only one of these as a proxy for remoteness would have been sufficient.

One indication of a possible multicollinearity problem is a high r2, but low levels of significance. This is because two or more variables might be capturing the same

underlying issue (e.g. remoteness), ensuring that this is captured by the regression as a whole, but does not appear to be captured by any single regressor. As a word of caution, it should be noted that multicollinearity does not, by itself cause a high r2 and/or low t-values.

Several ways have been suggested to measures the effect of multicollinearity. The most popular of these is the Variance Inflation Factor (VIF). This is defined as:

$$VIF(\hat{\beta}_i) = \frac{1}{1 - r_i^2} \qquad \textbf{(4.4)}$$

where r_i^2 is the r2 for the regression of x_i on the other explanatory variables. Maddala (2001: p.272) notes that the $VIF(\hat{\beta}_i)$ can be interpreted as the ratio of the "actual variance of $\hat{\beta}_i$ to what the variance of $\hat{\beta}_i$ would have been if x_i were to be uncorrelated with the remaining x's". Although, ideally, there would be no correlation amongst the x's, this is highly unlikely in the context of microeconometric studies such as those in this thesis.

Maddala (2001: p.272) goes on to say that the VIF is "not very useful and does not provide us with guidance on what to do with the problem. It is more of a complaint that things are not ideal" (as should be expected). In addition, it does not indicate whether the presence of "multicollinearity presents a problem in making inferences". Although other measures have been suggested, these are also highly imperfect.

Goldberger (1991) frames issues of multicollinearity as a problem of lack of observations, or (tongue-in-cheek) "micronumerosity". He notes that the main consequence of multicollinearity is to increase the standard errors. This happens quite correctly, because there is increased uncertainty about which variable is actually affecting the dependent variable. However, larger standard errors can also be the result of low sample size. In an interview for Economic Theory (Keifer, 1989) Goldberger terms a sample size of N=0 as "perfect micronumerosity", and a "small" sample size as "near micronumerosity". Large samples can therefore minimise any impact of multicollinearity, and, in sufficiently large samples, multicollinearity should not be considered an important issue. Alternatively put,

the problem of multicollinearity is actually a problem of micronumerosity, and the issue is minimised in “large” samples.

Several methods can be used to reduce the risks of multicollinearity, of which one is used in chapters 5 and 7; that of principle components analysis (PCA). This is used to create asset indexes for each household, rather than entering a large number of categorical variables indicating ownership or quality of different items.

Although discussed here for completeness, this is the last discussion of multicollinearity in this thesis. There is no sure-fire way to detect multicollinearity, and, in constructing all models presented in this thesis, all indications suggest that there is no cause for concern. Sample sizes can be considered “large”, all results were found to be robust to a fairly large number of changes in variable inclusion and specification, and there is not, overall, any indication that more variables should (in some sense) have been significant. In addition, no model presented includes both an r2 that appears excessively large and t-values that appear excessively low. Although the checks described above have been made throughout the thesis, Maddala (2001) considers that multicollinearity is not, in itself, a problem, whilst in one of the most complete and dependable guides to the methods and applications in microeconometric studies such as this, Cameron and Trivedi (2005) give only a cursory mention of multicollinearity.

(4) Homoskedasticity.

Also known as spherical error variance, this assumption states that the expected variance of the error terms is equal for each observations:

$$E(\varepsilon_i^2 \mid X) = \sigma^2 > 0 \qquad \text{(i=1,2,3,..., N)} \qquad \textbf{(4.5)}$$

In addition, it is assumed that there is no correlation amongst error terms (no autocorrelation):

$$E(\varepsilon_i \varepsilon_j \mid X) = 0 \qquad \text{(i, j = 1,2,3,... , N; i≠j)} \qquad \textbf{(4.6)}$$

If this assumption is not satisfied, then the error terms are said to exhibit heteroskedasticity. It can be shown that, in the presence of heteroskedasticity, OLS

estimates are unbiased but inefficient (e.g. Maddala, 2001; Hayashi, 2000). This means that tests of hypothesis, including significance levels, will not be correct.

Heteroskedasticity is difficult to observe since it is not known a priori what form it takes, and the tests designed to detect heteroskedasticity are imperfect (Ramsey RESET test, White test, Breusch-Pagan test).

This thesis therefore corrects all error terms for potential heteroskedasticity using White's (1980) method. This correction is discussed below.

4.2.1 Corrections

Some of the assumptions maintained to hold in the basic model cannot be assumed in some of the models presented in this thesis. For example, all models are corrected for potential heteroskedasticity, and some are corrected for clustering of error terms. In addition, IV is used in one extension where the exogeneity assumption is likely to have been violated. These corrections are discussed in this section.

4.2.1.1 Heteroskedasticity

White's (1980) method for correcting for heteroskedasticity is used throughout the empirical chapters of this thesis. Heteroskedastic robust standard errors ensure that standard errors and other statistics are reliable, even if the error variance is not constant. That is even if the second moment of the error term is some function, f(.) of the regressors.

$$E(\varepsilon_i^2 \mid X) = f(X) \qquad \textbf{(4.7)}$$

This is the case regardless of the form the heteroskedasticity takes (and including homoskedasticity), which is not necessarily known to the user. White (1980) shows that the standard errors of the coefficients can be adjusted to be reliable in the presence of any form of heteroskedasticity. The heteroskedasticity robust standard errors of $\hat{\beta}_i$ is shown by White (1980) to be:

$$Var(\hat{\beta}_i) = (X'X)^{-1}\left(\sum_{i=1}^{N} \hat{u}_i^2 x_i' x_i\right)(X'X)^{-1} \qquad \textbf{(4.8)}$$

where $\hat{u}^2$ are the residuals obtained from an initial OLS regression of y on x. Correction can also be made for N/(N-K) degrees of freedom.

Sribney (2007) explains the difference between the "baseline" standard errors and the heteroskedasticity robust standard errors:

> *"In [basic standard errors] the squared residuals are summed, but in [heteroskedastic robust standard errors]… the residuals are multiplied by the x's … and then "squared" and summed. Hence, any difference between them has to do with correlations between the residuals and the x's. If big (in absolute value) [u_i] are paired with big x_i, then the robust variance estimate will be bigger than the OLS estimate. If, on the other hand, the robust variance estimate is smaller than the OLS estimate, what's happening is not clear at all but has to do with some odd correlations between the residuals and the x's. If the OLS model is true, the residuals should, of course, be uncorrelated with the x's. Indeed, if all the assumptions of the OLS model are true, then the expected values of (1) the OLS estimator and (2) the robust … estimator [is] approximately the same when the default multiplier is used."*

Since it is not always possible to detect heteroskedasticity or be sure whether or not it is present, and since White's (1980) correction ensures that standard errors are robust, even under homoskedasticity, this thesis always makes this adjustment.

4.2.1.2 Clustering

Household data collected in developing countries is often sampled by cluster. That is, in a first stage, villages are randomly selected and in a second, households or individuals are randomly selected from each village. This introduces the issue of village specific unobservable effects. Deaton (2000: p.73) lists a multitude of reasons why observations within a village, or other cluster, might be more similar within the cluster than across clusters. For example, "local eccentricities are copied by those who live near one another", if villages are widely separated geographically "their inhabitants may belong to different ethnic or religious groups, they may have distinct occupational structures as well as different crops and cropping patterns". The difference in agricultural patterns and shocks means that it is essential to adjust standard errors for potential clustering in Chapter 7 which focuses on these issues. Deaton (2000: p.97) goes on to explain that:

> *"[w]here agriculture is important … there will usually be more homogeneity within villages than between them. This applies not only to the types of crops and livestock, but also to the effects of weather, pests, and natural hazards. If rains fail for a particular village, everyone engaged in rainfed agriculture will suffer, as will those in occupations that depend on rainfed agriculture. If the*

harvest price is good, prices will be low for everyone in the village, and although the effects will spread out to other villages through the market, poor transport networks and high transport costs may limit the spread of low prices to other survey villages. Indeed, there is often only one market in each village, so that everyone in the village will be paying the same prices for what they buy, and will be facing the same prices for their wage labour, their produce, and their livestock. This fact alone is likely to induce a good deal of similarity between households within a given sample cluster"

In OLS analysis, the assumption is that survey data are independent. As noted by Cameron and Trivedi (2005), this is often not the case. This is particularly true for developing countries and will cause error terms to be correlated within clusters.

This is potentially a serious issue in chapters 5 and 7. Chapter 7 studies the impact of regional shocks on households. Since all households in a particular district, or sub-district, are considered to have been potential victims of flooding or drought, other, unobserved factors not directly captured by the shock variables, may cause the error terms of households within these districts to cluster. It is therefore important to adjust standard errors for this.

Chapter 5 poses a similar issue. Individuals from the same family can appear several times in a single regression. Unobserved family characteristics may cause error terms to cluster, and make this correction necessary.

The cluster corrected, robust standard error of coefficients is given by:

$$Var(\hat{\beta}_i) = (X'X)^{-1}\left(\sum_{j=1}^{n_c} u_j' u_j\right)(X'X)^{-1} \qquad \textbf{(4.9)}$$

where $u_j = \sum_{j_{cluster}} \varepsilon_i * x_i$ and n_c the total number of clusters. The ε_i represent the residual for the i'th observation, and x_i is a row vector of regressors (Sribney, 2007). In other words, the cluster standard error replaces the errors of the robust standard error by the sums of the error terms over each cluster. Correction is also made for "degree of cluster freedom" (dfc) given by $dfc = \frac{N-1}{N-K} * \frac{C}{C-1}$ (Cameron and Trivedi, 2005).

Sribney (2007) explains the difference between the heteroskedastic robust standard errors, and the cluster corrected standard errors: "If the variance of the clustered estimator is less than the robust (unclustered) estimator, it means that the cluster sums of $\varepsilon_i * x_i$ have less variability than the individual $\varepsilon_i * x_i$. That is, when you sum the $\varepsilon_i * x_i$ within a cluster, some of the variation gets cancelled out, and the total variation is less. This means that a big positive is summed with a big negative to produce something small—there is negative correlation within cluster."

The correction for clustering used in this thesis is Stata's "cluster" option. This makes the assumption that within-cluster unobservable factors are uncorrelated with the regressors, and corrects the standard errors for clustering. Under this assumption, the parameters are consistent (Cameron and Trivedi, 2005). In Chapter 7, results are corrected for clustering at the district level (the level at which community shocks occur), even during the panel analysis. This is necessary if the unobserved factors are not constant over time. Since households are subject to different shocks at different times, it is likely that these factors are not consistent over the period of the survey. In Chapter 5, standard errors are corrected at the household level using the same technique since several individuals connected to the central households surveyed are included in each regression.

4.2.1.3 Two Stage Least Squares

Two Stage Least Squares (2SLS) is used in an extension presented in Chapter 7 in order to correct for simultaneity. The dependent variable, per capita consumption is estimated as a function of present and previous shocks. However, contemporaneous health poses the issue of simultaneity; it is not obvious that the direction of the causality is uniquely health shock to current consumption. It is possible that current consumption might also impact on the likelihood of suffering from a health shock.

This analysis needs to be constricted as a simultaneous equations model (SEM):

Current consumption = f(Current health shock, lagged health shock,
Current death, Lagged death, Current drought, Lagged drought,
Current flood, Lagged flood, X) **(4.10)**

Current health shock = f(Current consumption, •)

where X includes all other variables and • includes X and all other shock variables. Both community shocks are considered exogenous since an individual household's consumption will not impact on these shocks. There is potential to consider what is termed "current death" as endogenous since consumption might impact on likelihood that a household suffers from death. However, the construction of the variable makes this unlikely. Whilst health shocks are recent (previous 2 weeks), deaths can have occurred at any point since the previous round. Current consumption is not realised until the time of the survey. Thus, in some sense, current deaths can be considered to be already lagged (and hence exogenous), and lagged deaths to be lagged by an additional period.

Under simultaneity, the coefficients estimated by OLS are inconsistent. In a sufficiently large sample however, consistent estimates can be obtained using IV. Formally, the issue of simultaneity arises when we estimate:

$$y_1 = \alpha_1 y_2 + \beta_1 z_1 + u_1 \quad \textbf{(4.11)}$$

$$y_2 = \alpha_2 y_1 + \beta_2 z_2 + u_2 \quad \textbf{(4.12)}$$

where y_1 can be thought of as consumption, y_2 health shocks, and z_i all exogenous variables. The error terms for each model are given by u_i, and the α_i and β_i are the coefficients.

Under simultaneity, a regression of y_1 (consumption) on y_2 (health shocks) gives inconsistent estimates of both α_1 and β_1. Assuming that $\alpha_1 * \alpha_2 \neq 1$, then the reduced form of the model, whose parameters *can* be consistently estimated by OLS is given by:

$$y_1 = \pi_2 z_2 + \pi_1 z_1 + v_1 \quad \textbf{(4.13)}$$

where $\pi_2 = \frac{\alpha_1 \beta_2}{1 - \alpha_1 \alpha_2}$, $\pi_1 = \frac{\beta_1}{1 - \alpha_1 \alpha_2}$ and $v_1 = \frac{u_1 + \alpha_1 u_2}{1 - \alpha_1 \alpha_2}$.

But Chapter 7 is interested in the consistent estimation of α_1 and β_1, that is, the impact of a health shock and other variables on consumption, and not the parameters π_1 and π_2

given by the reduced form. It uses 2SLS to estimate the structural equations on which the extension focuses.

The system of equations is set up as follows:

$$Health = \alpha_1 Cons + \beta_1 x_1 + \gamma_1 z + u_1 \quad \textbf{(4.14)}$$
$$Cons = \alpha_2 Health + \beta_2 x_2 + u_2 \quad \textbf{(4.15)}$$

where health shocks at time t (Health) are modelled as a function of per capita consumption at time t (Cons), control variables common to both sets of regressions, x_1, and z, variables which impact on health shocks, but not on consumption. Consumption at time t is modelled as a function of health shocks at time t and x_2 which includes all control variables. Time subscripts are omitted for clarity and conciseness.

In Chapter 7, lagged log per capita income and number of household members over the age of 55 years are included in z. These are shown to be positively correlated with health, but exogenous to the consumption model in 4.18 (they pass over- and under-identifying restrictions). They can thus be used as instruments to identify the parameter α_2 in 4.18. That is, 2SLS makes it possible to assess the impact of a current health shock on current consumption.

In the first stage, Health is regressed against all exogenous variables. The predicted values, HealthHat, are obtained, and replace x_2 in 4.18. In addition, the error in 4.18 then becomes a composite error term:

$$Cons = \alpha_3 HealthHat + u_3 \quad \textbf{(4.16)}$$

where $u_3 = \varepsilon + \phi(Health - HealthHat)$. 2SLS therefore estimates α_3, which is a consistent estimator for α_2 since HealthHat is asymptotically uncorrelated with the error term. Replacing with the notation above, Hayashi (2000: p.192) describes why this estimator is consistent:

> *"If the fitted value [HealthHat] were exactly equal to the least squares projection* $\hat{E}^*(HealthHat \mid x, z)$*, then neither [*$\varepsilon$*] nor [Health-HealthHat] would be correlated with*

[HealthHat]: [ε] is uncorrelated because it is uncorrelated with [x, z] and [HealthHat] is a linear function of [x, z], and [Health-HealthHat] is uncorrelated because it is a least squares projection error. The fitted value [HealthHat] is not exactly equal to $\hat{E}^*(HealthHat \mid x, z)$, but the difference between the two vanishes as the sample gets larger. Therefore, asymptotically, [HealthHat] is uncorrelated with [u_3].”

The Hansen test for over-identifying restrictions is made. This tests whether the instruments are uncorrelated with the error term and that the excluded instruments are correctly excluded from the estimated equation. The null hypothesis is that this is true. A rejection should therefore cast doubt on the validity of the instruments. The Kleibergen-Paap test is relevant where the instruments are correlated with the with the excluded variables, but only weakly. In addition, the Kleibergen-Paap is the heteroskedastic equivalent of the Cragg-Donald test, which performs the same operation but is valid only under homoskedasticity (which is never assumed in this thesis). This statistic is essentially an F-statistic from the first stage of the regression (with adjusted confidence intervals) which tests the null hypothesis that the instruments do not enter the regression (Stock and Yogo, 2004). It is therefore essential to reject this null hypothesis.

4.3 PANEL DATA ANALYSIS

This thesis uses panel, or longitudinal, data in Chapter 7. Panel data, or robustness to panel methods, is often considered to be the most reliable econometric methods. Whilst OLS allows the user to control for as many variables as the data (and degrees of freedom) will allow, there might be other, unobserved factors which influence the dependent variable. If these factors are also correlated with any of the independent variables, the coefficients will be biased.

Methods such as fixed effects (FE) offer a means to eliminate the impact of unobserved, but temporally constant unobservables, helping to reduce the likelihood of any these biasing the coefficients. Chapter 7 uses FE in order to show that OLS results are robust to these methods.

Panel data models can be written as:

$$y_{it} = \alpha_{it} + x_{it}^{'}\beta_{it} + u_{it} \qquad \text{i=1,2,3,..., N; t=1,2,3,...,T} \qquad \textbf{(4.17)}$$

where household (in this thesis) and time subscripts are i and t respectively[28]. The y_{it} is a scalar dependent variable, x_{it} is a K*1 vector of K independent variables and u_{it} is the error term.

Equation 4.20 gives the pooled panel model which can be estimated consistently using OLS provided that the model is correctly specified and that the regressors are not correlated with the error.

Chapter 7 uses, in part, a version of the pooled panel model which includes time dummies. This is given by:

$$y_{it} = \alpha_{it} + \sum_{s=2}^{T} \gamma_s D_{s,it} + x_{it}^{'} \beta_{it} + u_{it} \quad \textbf{(4.18)}$$

where D is a time dummy included for each time period, s, with the baseline time period dropped in order to ensure no perfect multicollinearity. This method aims to sweep away any temporal factors which impact on all households. As shown in Chapter 2, the dependent variable used in Chapter 7 is change in log consumption.

Fixed Effects treats the error term slightly differently. The error term can be divided into two components: $u_{it} = \mu_i + v_{it}$ where μ_i represents an unobservable, household specific effect which is time invariant, and not captured by any control variables and v_{it} is the remaining, "well behaved", error term. The model thus becomes:

$$y_{it} = \alpha_{it} + x_{it}^{'} \beta_{it} + \mu_i + v_{it} \quad \textbf{(4.19)}$$

If the μ_i term can be treated as distributed independently of the regressors, then random effects (RE) models can be used. This is a stronger assumption than that required with FE. Since the aim in Chapter 7 is to ensure results are robust to panel methods, and robustness to FE is a stronger result than robustness to RE, the focus here is on FE.

The μ_i terms are assumed to be fixed parameters to be estimated which do not vary over time. Each household is assumed to have some individual heterogeneity which is

[28] Here, the i and t subscripts are written explicitly to emphasise the panel nature of the data.

unobserved and which impacts on the dependent variable, and since it is not possible to assume that this is uncorrelated with the other variables, the aim is to control for this, ensuring consistent estimates of the parameters of interest. This unobserved heterogeneity is swept away using dummy variables for each household. Thus, this method is sometimes known as Least Squares Dummy Variables (LSDV) and can be written:

$$y_{it} = \sum_{j=1}^{N} \alpha_j D_{j,it} + x_{it}^{'} \beta_{it} + v_{it} \qquad \textbf{(4.20)}$$

where N household dummies are included equal to 1 if i=j and 0 otherwise. Alternatively put, the intercept is allowed to differ for each observation, but remains constant over time.

4.4 PROBIT MODELS

Probit models aim to understand which variables contribute to the likelihood of an event taking place. In Chapter 5, which studies motivations for remitting, they assess the contribution of different factors to the probability that someone will send or receive remittances. In Chapter 7 probit regressions are used to answer a specific question; whether shocks (death, sickness, flooding, and drought) impact on the likelihood of receiving remittances from different geographical sources. This section discusses the pooled probit models used in chapters 5 and 7, and the random effects probit models which are presented in chapter 7.

Probit models can be thought of as modelling a latent variable, R*, which follows an OLS format, with all usual assumptions:

$$R_i^{*} = x_i^{'} \beta + \varepsilon \qquad \textbf{(4.21)}$$

However, rather than observing R*, it is only possible to learn whether or not an event has taken place. Thus, we observe:

$$R_i = \begin{cases} 1 \text{ if } R_i^{*} > 0 \\ 0 \text{ if } R_i^{*} \leq 0 \end{cases} \qquad \textbf{(4.22)}$$

This thesis uses probit models to predict whether or not individual i receives remittances from individual j in Chapter 5 depending upon the characteristics of i and j. Chapter 7 aims to understand whether shocks effect the probability of remittances from near and distant sources using probit models. Thus,

$$P(R_i = 1 \mid x_i) = f(x) \quad \textbf{(4.23)}$$

where, R=1 when i receives remittances and 0 otherwise. The function, f(.) is specified as:

$$f(x) = \Phi(x_i'\beta) = \int_{-\infty}^{x'\beta} \phi(z)dz \quad \textbf{(4.24)}$$

where x contains a constant, Φ is the standard normal cumulative distribution function (cdf) and ϕ is the standard normal density function (pdf).

Although we observe only whether a household/individual sent or received remittances, the model predicts the probability that any household/individual sent/received remittances using explanatory variables contained in x. Unlike the linear probability model (LPM), which uses OLS, the probit ensures that predicted probabilities lie between zero and one.

4.4.1 Random effects probits

Random effects probit models extend the basic analysis to include a temporal dimension. In initial models, pooled probits are run:

$$P(R_{it} = 1 \mid x_{it}) = \Phi(x_{it}'\beta) \quad \textbf{(4.25)}$$

As with fixed effects, however, it is possible to imagine that there might be some unobserved effects which are specific to each individual, but constant over time, c_i. The estimated model therefore becomes:

$$P(R_{it} = 1 \mid x_{it}, c_i) = \Phi(x_{it}'\beta + c_i) \quad \textbf{(4.26)}$$

Since there are no lagged dependent variables, the main assumption here is that the c_i appears additively inside the $\Phi(\bullet)$. Ideally, this would be estimated using a fixed effects

method in which dummies control for all unobserved heterogeneity which is time constant. Unfortunately, this model does not produce consistent parameters (Wooldridge, 2002). Treating the c_i as an unobservable random variable in the same vein as (x_{it}, Y_{it}) produces the random effects probit model. This can be estimated consistently but relies on the additional assumption:

$$c_i \mid x_i \sim N(0, \sigma_c^2) \qquad \textbf{(4.27)}$$

That is, that c_i and x_i are independent and that c_i is normally distributed. The parameters, β and σ_c^2 can be estimated using Maximum Likelihood Estimation (MLE). In addition, since the variance of the latent variable is 1, the proportion of variance due to the unobserved effects can be estimated as $\rho=\sigma_c^2/1+\sigma_c^2$. This result is reported in all relevant regressions as rho.

Wooldridge (2002) notes that correcting for heteroskedasticity is important in both pooled and random effects due to likely heteroskedasticity of error terms.

4.5 TOBIT MODELS

It is possible to think of Tobit models as an extension to probits. Rather than observing only whether an event occurred or not, however, we observe 0 if the latent variable, R_i is less than or equal to 0, and observe $x_i'\beta + \varepsilon$ otherwise.

$$R_i = \begin{cases} x_i'\beta + \varepsilon & \text{if } R_i^* > 0 \\ 0 & \text{if } R_i^* \leq 0 \end{cases} \qquad \textbf{(4.28)}$$

where R_i^* is the latent variable which can take any positive or negative value and satisfies all classical linear model assumptions. However, we observe R_i only when R_i^* is positive. Thus:

$$R_i = \max(0, R_i^*) \qquad \textbf{(4.29)}$$

The probability of any R_i being equal to zero is:

$$P(R_i = 0 \mid x_i) = 1 - \Phi(x_i^{'}\beta / \sigma) \quad \textbf{(4.30)}$$

where, as before, the subscript i indicates household i, Φ is the standard normal distribution and σ is the standard error of the regression. The marginal effects of this model are of particular interest.

McDonald and Moffitt (1980) show that in this model, the marginal effects of the latent variable, R*, are given by the coefficients, β. In cases in which the data are truly censored, and it is possible to have negative values of R, then these are the parameters of interest. However, the next section shows that some adjustments are required in order to obtain the impact of the independent variables on R, and these adjustments are particularly relevant for consumption functions. This can be decomposed into two parts: (1) the change in R of those above the zero (or another value), weighted by the probability of being above the limit; and (2) the change in the probability of being above zero, weighted by the expected value of R, if above. This is shown in the following section for consumption functions.

4.5.1 Consumption functions and Tobit models

Consumption functions are estimated in Chapter 6 which studies the impact of income from different sources on household consumption choices. In particular, Tobit models are used to estimate consumption functions for different categories of good, g. It aims to understand whether remittances are used differently from other sources of income. OLS is the standard methodology used for estimating cross-sectional consumption functions.

However, in a developing context, a large proportion of households report zero consumption of several categories of good, biasing the regression coefficients. Several corrections are possible. One option is to use a Heckman two-step model, which first models likelihood of consuming goods in category g, and then uses the results to correct the OLS regression for amount spent. This method is most suitable if it can be argued convincingly a priori that different factors influence the decision to spend on good category g, and the amount spent.

Deciding between using Tobit models and Heckman models presents a number of difficulties in this case. There is not, for example, one variable which should obviously

enter the first stage which could also be dropped from the second stage. However, in each case, it might be possible to identify such variables. For example, when studying MPC education, a variable indicating whether not the respondent has children may determine whether or not the household spends on education, but not how much. However, it is not possible to use this variable for every consumption function estimated. It would thus be necessary to identify different variables in each case (if it is possible to identify one at all).

This would present the difficulty of comparing at best Heckman models with different variables excluded, and at worst, a selection of different Heckman and Tobit models. One of the aims is to be able to run regressions which are as comparable as possible in order to understand the impact of the same set of variables on the dependent variable. This is of utmost importance in Chapter 5 in which the aim is to understand how certain variables impact on remittance receipts and to compare the impact of each variable depending upon the relationship between the sender and the receiver. In Chapter 6, in which the aim is to obtain MPCs out of different income sources for each of several consumption categories, it is useful to be able to understand the different uses of income.

Models which render such comparisons less reliable would reduce the level of confidence when comparing the different regression results. It should be noted however, that the results of any one individual regression might be more reliable. The choice is therefore a difficult one, and the 'correct' choice not immediately obvious. Due to the weight this thesis attaches to being able to being able to make reliable comparisons between regressions, Tobits are favoured. However, the reader should bear in mind these issues whilst reading the results.

In Chapter 5, in addition to estimating net remittances received using OLS, and probability of sending and receiving remittances, Tobit models for the amount of remittances received and sent are estimated. As for Chapter 6, there exist a significant number of people that send/receive zero remittances. Estimating an OLS model will bias the coefficients. Again here, if it can be argued a priori that different factors determine whether or not remittances are sent and how much is remitted, a Heckman model can be used. Such models have been estimated by Agarwal and Horowitz (2002) who use a dummy variable indicating whether or not a household migrant had been settled in

his/her new location for over a year as the omitted variable in the second stage. That is, having been settled in the host country is argued to determine likelihood of the migrant sending remittances, but not the value sent. It is possible, but not immediately obvious, that this might be the case, but there are no obvious variables which might fulfil this role in the data used in this study. In addition, the data used here allow studying both the amount sent and the amount received by the respondent. It is unlikely that the same variable could be dropped in each circumstance. In the interest of comparability, this thesis chooses to use Tobit models for both the value of remittances sent and the value received.

Several studies use Tobit models to estimate consumption functions. Examples include Kinsey (1983) who studies food consumption outside of the home; Sharpe, Abdel-Ghany and Silver (1995) who compare spending patterns of lone-parent and two-parent Canadian families; and Abdel-Ghany and Sharpe (1997) who compare old and young spending patterns. In all cases Tobit models are used since some households exhibit zero consumption of certain categories of good.

McDonald and Moffit (1980) show that the expected value of the dependent variable, C_g can be decomposed into two parts: (1) the change in C_g of those above the zero (or another value), weighted by the probability of being above the limit; and (2) the change in the probability of being above zero, weighted by the expected value of C_g, if above. Thus, in Chapter 6, this thesis follows these studies in reporting marginal propensities to consume out of different income sources given by:

$$\frac{\partial E(C_g \mid x)}{\partial x_i} = P(C_g > 0 \mid x)\left(\frac{\partial E(C_g \mid x, C_g > 0)}{\partial x_i}\right) + E(C_g \mid x, C_g > 0)\left(\frac{\partial P(C_g > 0 \mid x)}{\partial x_i}\right) \quad \textbf{(4.31)}$$

Wooldridge (2002: p.523-524) shows that his can be reduced to:

$$\frac{\partial E(C_g \mid x)}{\partial x_i} = \Phi(x_i^{'}\beta / \sigma)\beta_i = P(C_g > 0 \mid x)\beta_i \quad \textbf{(4.32)}$$

where $\Phi(x\beta/\sigma)$ is the probability of observing a positive response, given x. This can be thought of as a scaling factor which adjusts the Tobit coefficients. Where $\Phi(x\beta/\sigma)$ is close to unity, there are unlikely to be many zero expenditures reported for the categories, and the estimated MPC collapses to the Tobit coefficient.

4.6 CONCLUSION

This chapter has discussed the econometrics used during chapters 5 to 7. Although a variety of techniques are used, it has shown why the selected ones have been chosen and are relevant in each case. Where it would help the overall flow however, discussion has been left to the individual chapter. This allows particular idiosyncrasies or robustness tests to be considered within their specific context. Despite this, the major econometric methodologies used are explained and justified, and links to other studies and econometric texts noted. The following three chapters use the methods discussed here to contribute to the understanding of remittances in the context of rural Malawi.

5 WHY DO PEOPLE REMIT? MOTIVATIONS FOR REMITTING IN RURAL MALAWI

5.1 INTRODUCTION

This chapter looks at remittances at their genesis, when the sender decides to remit. It seeks to answer the question, "what motivates people to remit?" and extends current studies in several ways. Firstly, the data contain information on remittance flows in both directions. That is, this chapter is able to model both net remittance flows and motivations to remit from each side of the remittance relationship, or dyad. At the time of writing, only VanWey (2004) is able to do this. Secondly, the data provide information not only on a household and their children (as is the case for most studies), but also on their parents and siblings. This allows this chapter to estimate motivations for remitting for each relationship and to assess any differences. This is important since it seems likely that a child will not remit for the same reasons as a parent. Thirdly, all remittance flows are from an individual, rather than a household perspective. This has several advantages and disadvantages. The major disadvantage is that remittances can be viewed as a part of a household activity. That is, remittances might be given to one member but used for the benefit of several members, or, alternatively, that the household has decided as a whole to send a migrant away to earn money and to pool income. This would make the household level more appropriate, and is supported by literature stemming from the New Economics of Labour Migration (Bloom and Stark, 1985). This however makes an assumption which is not entirely appropriate for the current data. Firstly, it is not clear that all households that receive remittances do so because of an economic decision to migrate. Rather, other (cultural) factors are likely to predominate – notably marriage or, in the case of children, *individual* career aspirations. This is particularly the case for siblings who have left the same household as the respondents (that of their parents). Secondly, studies which analyse remittances on a household level tend to use the head's characteristics. Here information on remittances and characteristics were collected on an individual level making it possible to use the husband's or wife's characteristics, as appropriate. One possibility would be to include the characteristics of both the husband and the wife, but this would result in all observations for which data are absent on one of the partners (single heads or no-response) being dropped. In any case, even though the analyses are conducted at an individual level, the data contain (almost) as much

information as most household level studies, which control for the head's characteristics (here replaced with the individual recipient's characteristics) and the household characteristics such as household size (which are also included in this study). Given these data limitations, this chapter proceeds with studying remittances from the individual perspective, but the limitations do suggest several extensions, notably studying only those households whose potential remittance partners live outside of their home district and using only those households with both male and female data and including both sets of characteristics.

The results show that different variables affect remittances in different relationships. As in other studies, one single motivation does not drive remittances. Indeed such a conclusion would perhaps be somewhat surprising given that an individual or a groups of individuals are likely to have several motivations to remit; one motivation to remit does not necessarily preclude another. In addition, some motivations may actually be complementary – the threat of disinheritance for example, may ensure that a child pays an insurance "indemnity" to a parent. Despite these complications, the results are informative. In particular, there is evidence that parents and siblings remit in order to help "insure" health shocks suffered by the respondent. Children increase remittances to respondents as the reliability of the respondent as an insurer increases and as their own risk of a shock increases – children therefore remit to their parents, in part, in order to insure themselves. There is a strong element of bi-directionality in remittance flows between respondents and their parents, and respondents and their siblings but this is not the case for their children. Respondents are more likely to remit to parents and siblings whose health is poorer suggesting a strong degree of altruism on the part of the respondents. There is tentative evidence that children remit to respondents for inheritance motivations, and that respondents remit to their own parents for the same reason. Overall, altruism appears to be a strongest motivation to remit for all groups.

5.2 METHODOLOGY

This chapter follows other papers summarised in Chapter 2 in modelling remittances as a function of sender and receiver characteristics. The data used have the advantage of containing the value of remittance flows in each direction of the transfer relationship and for each individual. In addition, the sampling purposively targeted working age adults in order to understand the transfer relationships between themselves and their parents,

their children, and their siblings. Thus, it is possible to compare and contrast motivations for remitting for each group.

It is worth noting that the remittance flows between the respondent and their parents could be regarded as equivalent to flows between the respondent and their children since in both cases the relationship is parent-child. Equations are nonetheless estimated separately since the respondent is unlikely to view their parents and children in the same way, or as fulfilling the same function with regards to transfer relationships. Remittance flows are therefore likely to exhibit different characteristics. In addition, since working age adults were targeted, there is a large age difference between the respondent and their parents in terms of age with parents being on average around 60 years and respondents around 33 years. This can make a significant difference in terms of inheritance anticipations, and it is interesting to allow estimated parameters for the two groups to differ.

All remittance flows are between individuals rather than households. That is, the male and female in the targeted household reported remittances sent and received individually. Thus remittance flows between, for example, the female and her eldest son, are treated as a separate remittance flow to that between the female and her second son, which in turn, is a different remittance flow from the flow between the male and second son. Before estimation, it was verified the male and female did not report the same remittance flow.

Since remittances are estimated in dyads, it is possible for one individual to appear in the regression more than once, and members of the same family will appear multiple times in a single regression. This introduces a potential problem of clustering of errors into the regressions. All regressions are therefore corrected for potential clustering at the household level (Deaton, 1997: pp.74-78). In addition, all standard errors are corrected for potential heteroskedasticity using White (1980).

Although net flows capture an important component of the remittance relationship, there is little distinction between those who do not engage in a potential remittance relationship and those who give and receive a similar amount. For this reason it is useful

to extend the analysis by estimating a series of probit regressions indicating both whether or not remittances were sent to and received from a potential transfer partner.

In addition to probits, Tobit models are estimated for the value of remittances sent by each side of the dyad. Tobits are appropriate since the value of remittances is censored at zero. It is not clear, a priori, that the choice of whether or not to send remittances is determined by variables different from those which determine amount sent. Tobit models are therefore favoured over Heckman selection models. The estimated Tobits include the same variables as the probits. Estimation methods are discussed in more detail in Chapter 4.

As with the OLS and probits, error terms are corrected for potential heteroskedasticity using White (1980) and, since individuals from the same household appear several times, potential clustering of errors at the household level is corrected for.

Similar discriminating hypotheses can be used in each case. Those used by other authors were summarised in the literature review and the following section draws on the theoretical conclusions and empirical methodologies elucidated in Chapter 2 to show the discriminating hypotheses used when evaluating the results.

5.2.1 Discriminating hypotheses

This study focuses on four motivations for remitting: altruism, inheritance, payment for services and co-insurance. This last motivation is divided into insurance premium payments and insurance indemnities or payouts. The tables in this section summarise the expected signs of coefficients on the discussed variables under each of the motivations.

Under altruism, remittance receipts from a parent would be decreasing in the respondent's wealth, as indicated by the theoretical model in Chapter 2 (Rapoport and Docquier, 2006). If remittance flows are altruistic, a parent would also increase remittance flows (or the likelihood of remitting) if the respondent suffers from a health shock and decrease remittance flows as the respondent's health improves.

If a parent's remittances are an insurance premium, they are likely to increase as the respondent become a more reliable insurer. Thus, they are increasing in the respondent's wealth and health. In addition, they can be expected to increase as the likelihood that a

parent suffers from a negative shock increases, as shown in the theoretical insurance model described in Chapter 2 (Agarwal and Horowitz, 2002). Thus, as a parent ages, s/he is likely to increase remittances, and parents in better health will remit less. Under the co-insurance/income pooling hypothesis, we are likely to observe remittance flows in each direction. Therefore, there will be a positive association between the likelihood that a parent remits to the respondent, and the likelihood that a respondent remits to his/her parent. This variable might also capture traditional gift-sharing motivations (Mauss, 1990).

If remittances from a parent are insurance payouts, a respondent is more likely to receive or to receive more remittances as wealth decreases. Having suffered from a health shock will increase remittance flows under this motivation.

The data permit the analysis of one service provided by the respondent for their parents: that of looking after a sibling. If remittances are payment for this service then remittances or likelihood of receiving remittances will be higher for respondents who reported looking after a sibling.

If respondents remit to parents for altruistic motivations, the number of heirs (potential remitters) will have a negative impact on remittances as other people are likely to ensure that the parents have a good quality of life (Agarwal and Horowitz, 2002). Respondents will be less likely to remit or remit less to their parents if their parents are in better health.

Like parents, respondents are more likely to choose to insure themselves with their parents if their parents make better insurers. Thus, if remittances are an insurance premium, they will decrease in the parent's age, and increase in the parent's health and schooling. As before, under the co-insurance/income pooling hypothesis, we are likely to observe remittance flows going in each direction. Both respondents and their parents are more likely to practice co-insurance if they do not live near each other due to weather patterns – and therefore income – being less correlated as distance increases. Chapter 7 focuses on remittances as insurance for shocks, with the geographical source of remittances being of the utmost importance for community shocks such as floods or droughts.

If remittances to a parent are an insurance indemnity, there will be a negative correlation between remittances and the parent's health, which, in the absence of a health shock variable, will partly capture health shocks.

If respondents remit to their parents in order to safeguard inheritance, with competition from other potential heirs, remittances will be increasing in the likelihood of inheriting. Thus they increase with age, and decrease as health improves. The number of heirs a parent has an ambiguous effect. As heirs increase, so does competition to inherit, creating a positive impact on remittances. This is especially true in the Malawian culture in which inheritance does not automatically go to the eldest son/daughter, but is determined by a committee of surviving relatives who assess which children deserve to inherit based on whether or not they are seen to have done their duty towards their parents (Takane, 2007). Heirs might equally have a negative impact as both the probability of inheriting and the amount likely to be inherited decline. De la Brière et al. (2002) find that remittances are increasing in inheritable land but decreasing in the number of heirs and conclude in favour of an inheritance motive.

The impact of a parent living in the same village is not clear since, traditionally, children who stay in the village of origin are more likely to inherit. This might serve to help guarantee inheritance without the need for remitting, or social customs might require remittances to be sent in order to safeguard inheritance.

Table 5.1: Motivations for remitting for the Respondent-Parent dyad

Parent's motivations for remitting to Respondent					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Respondent's wealth	Negative	Positive	Negative	-	No Direct Impact
Respondent's general health	Negative	Positive	No Direct Impact	-	No Direct Impact
Respondent suffered health shock	Positive	No Direct Impact	Positive	-	No Direct Impact
Respondent looks after sibling	No Direct Impact	No Direct Impact	No Direct Impact	-	No Direct Impact
Respondent sends remittances	No Direct Impact	Positive	No Direct Impact	-	Positive
Parent's age	No Direct Impact	Positive	No Direct Impact	-	No Direct Impact
Parent's health	No Direct Impact	Negative	No Direct Impact	-	No Direct Impact
Parent lives in same village	No Direct Impact	Negative	No Direct Impact	-	No Direct Impact
Respondent's motivations for remitting to Parent					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Parent's age	No Direct Impact	Negative	No Direct Impact	Positive	-
Parent's heirs	Negative	No Direct Impact	No Direct Impact	Positive / Negative	-
Parent's health	Negative	Positive	Negative / No Direct Impact	Negative	-
Parent's schooling	No Direct Impact	Positive	No Direct Impact	Positive	-
Parent sends remittances	No Direct Impact	Positive	No Direct Impact	No Direct Impact	-
Parent lives in same village	No Direct Impact	Negative	No Direct Impact	?	-

Table 5.2 shows expected signs on coefficients under each motivation for children's remittances to respondents. Impacts are the same as for a parent remitting to the respondent with one addition. If children remit for insurance purposes, neither the number of children (potential heirs) nor the number of them remitting should impact on remittances as each risk-averse child will choose to be fully insured (Agarwal and Horowitz, 2002). If remittances from children are altruistic in nature however, the number of children alone would have a negative impact as all children can potentially provide altruistic funds to ensure the respondents' standard of living is maintained. However, under the assumption that children have some knowledge of how many of their siblings are remitting, then what will matter is not the number of children, but the number of children who actually remit. Under altruism, remittances will therefore be declining in the number of children remitting, whilst under an insurance hypothesis neither variable will have an impact.

If remittances are, in part, motivated by inheritance, the number of children will reduce the expected inheritance for any one child whilst the number of children remitting will

increase competition. Remittances from children to respondents will therefore be declining in number of children and increasing in the number remitting.

Under insurance, a child is more likely to insure him/herself with a respondent who is a more reliable insurer. Thus, if remittances are a form of insurance premium they will be increasing in the respondent's wealth and health. It is possible that older respondents will be seen as worse insurers suggesting a negative impact, but the sampling targeted working-age adults so that this might not be a consideration. Children are also more likely to require insurance as the risk of a shock to themselves increases; children in better health will therefore be less likely to remit to their parents under this motivation.

Coefficients under remittances as insurance indemnities all follow the same sign for children remitting to respondents as for parents remitting to respondents, which is discussed above.

Table 5.2: Motivations for remitting for the Respondent-Child dyad

Children's motivations for remitting to Respondent					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Respondent's wealth	Negative	Positive	Negative	Positive	No Direct Impact
Respondent's general health	Negative	Positive	No Direct Impact	Negative	No Direct Impact
Respondent suffered health shock	Positive	No Direct Impact	Positive	No Direct Impact	No Direct Impact
Respondent looks after grandchild	No Direct Impact	No Direct Impact	No Direct Impact	No Direct Impact	Positive
Respondent sends remittances	No Direct Impact	Positive	No Direct Impact	No Direct Impact	No Direct Impact
Number of children respondent has	Negative/No Direct Impact	No Direct Impact	No Direct Impact	Negative	No Direct Impact
Number of children remitting	Negative	No Direct Impact	No Direct Impact	Positive	No Direct Impact
Respondent's age	No Direct Impact	No Direct Impact/Negative	No Direct Impact	Positive	No Direct Impact
Child lives in city or abroad	No Direct Impact	Positive	No Direct Impact	?	No Direct Impact
Child's health	No Direct Impact	Negative	No Direct Impact	No Direct Impact	No Direct Impact
Respondent's motivations for remitting to Parent					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Child's health	Negative	Positive	Negative / No Direct Impact	-	-
Child lives in city or abroad	No Direct Impact	Positive	No Direct Impact	-	-
Child sends remittances	No Direct Impact	Positive	No Direct Impact	-	-

Table 5.3 shows expected signs on coefficients under each motivation for siblings' remittances to respondents and respondents' remittances to siblings. No discussion regarding inheritance is made since siblings rarely inherit from each other.

As before, under sibling altruism, the remittances should be decreasing in the respondent's wealth, but increase if the respondent has suffered from a recent health shock. Under co-insurance, remittance receipts will increase as the respondent makes a better or more reliable insurer; remittances will therefore increase in the respondent's wealth and health. For the same reasons as outlined above, remittances will be higher if the respondent and their sibling live far apart. A sibling is more likely to choose to insure him/herself as his/her health deteriorates resulting in a negative relationship between the sibling's health and remittances.

As before, if remittances are an insurance payout/indemnity, remittances should increase following a health shock, and if remittances are payment for looking after the sibling's child, looking after a nephew/niece should have a positive impact on remittances.

From the respondent's perspective, altruistically motivated remittances are decreasing in the quality of the sibling's health, whilst insurance premiums are increasing in this variable. The impact of a sibling's health if remittances are partly an insurance indemnity is likely to be negative if the overall health score is sensitive enough to capture a part of the shock, but with no direct impact otherwise.

Table 5.3: Motivations for remitting for the Respondent-Sibling dyad

Sibling's motivations for remitting to Respondent					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Respondent's wealth	Negative	Positive	Negative	-	No Direct Impact
Respondent's general health	No Direct Impact	Positive	No Direct Impact	-	No Direct Impact
Respondent suffered health shock	Positive	No Direct Impact	Positive	-	No Direct Impact
Respondent looks after nephew/niece	No Direct Impact	No Direct Impact	No Direct Impact	-	Positive
Respondent sends remittances	No Direct Impact	Positive	No Direct Impact	-	No Direct Impact
Sibling lives in city or abroad	No Direct Impact	Positive	No Direct Impact	-	No Direct Impact
Sibling's health	No Direct Impact	Negative	No Direct Impact	-	No Direct Impact
Respondent's motivations for remitting to Sibling					
	Altruism	**Co-insurance (premium)**	**Co-insurance (indemnity)**	**Inheritance**	**Implicit payment for services**
Sibling's health	Negative	Positive	Negative / No Direct Impact	-	-
Sibling lives in city or abroad	No Direct Impact	Positive	No Direct Impact	-	-
Sibling sends remittances	No Direct Impact	Positive	No Direct Impact	-	-

5.2.2 Model specification

As noted in equation 2.7 in Chapter 2, all models estimated take the form:

Remittances = f(Receiver characteristics; Sender characteristics) (5.1)

where 'Remittances' is the value of remittances sent or received (Tobit), net remittances (OLS) or whether or not remittances were received (probit) and f(.) is the relevant function (Tobit, OLS, probit). The receiver and sender characteristics are potentially difficult to select, but should include any control variables which are standard to include on individual or household level studies – for example, age, marital status and sex – and variables which theory and previous empirical studies have found to be of importance. As such, all variables which make it possible to make discriminating hypotheses regarding the motivation for remittances should be included. This includes the respondent's wealth and their health, as well as information on the remittance partner's health, and geographical location.

In addition, data availability presents a constraint on variable inclusion. For example, it would be ideal to include information on a sibling's level of education, on whether respondents' remittance partners recently suffered from a health (or other) shock, and on the level of wealth of respondents' remittance partners. Unfortunately these data are not available. Discussion of variables included and their descriptive statistics are given below.

Table 5.4: Summary statistics for Respondent-Parent remittance flows

Variable	Obs	Mean	Std. Dev.	Min	Max
Net remittances from parent	1083	-54.04	504.10	-4910	6175
Received remittances from parent	1083	0.51	0.50		1
Value of remittances from parent	1083	108.97	370.99	0	6350
Sent remittances to parent	1083	0.65	0.48		1
Value of remittances to parent	1083	163.00	365.40	0	5000
Income	1083	255.66	1290.40	0	20000
Asset index (farm)	1083	0.03	1.28	-0.62	15.42
Asset indes (non-farm)	1083	0.13	1.56	-2.00	3.06
Education (years	1083	4.61	3.31	0	14
Age	1083	30.45	8.81	1	61
Male	1083	0.42	0.49		1
Married	1083	0.98	0.14		1
Household size	1083	3.53	1.89	1	14
Respondent eldest child	1083	0.23	0.42		1
Health (1-10)	1083	8.36	1.78	2	10
Health problem in last month	1083	0.25	0.43		1
Sibling in house	1083	0.12	0.33		1
Parent's age	1083	55.85	18.25	0	99
Parent's health (1-10)	1083	6.29	2.31	1	10
Parent lives in same village	1083	0.34	0.47		1
Parent has some schooling	1083	0.71	0.45		1
Number of heirs parent has	1083	7.99	2.75	1	20
Mother (not father)	1083	0.55	0.50		1
Matrilineal heritage	1083	0.15	0.36		1
Patrilineal heritage	1083	0.44	0.50		1
Northern village (Mwankhunikira)	1083	0.08	0.28		1
Northern village (Mwahenga)	1083	0.30	0.46		1
Central village (Mkanda)	1083	0.41	0.49		1

Table 5.5: Summary statistics for Respondent-Child remittance flows

Variable	Obs	Mean	Std. Dev.	Min	Max
Net remittances from child	430	-93.18	511.39	-4000	5000
Received remittances from child	430	0.37		0	1
Value of remittances from child	430	88.33	305.68	0	5000
Sent remittances to child	430	0.55		0	1
Value of remittances to child	430	181.50	391.64	0	4000
Income	430	308.79	1231.73	0	20000
Asset index (farm)	430	0.12	1.47	-0.62	7.08
Asset indes (non-farm)	430	0.14	1.65	-2.00	3.06
Education (years	430	4.65	3.26	0	13
Age	430	48.37	8.37	25	73
Male	430	0.56		0	1
Married	430	0.97		0	1
Household size	430	4.44	2.02	1	12
Health (1-10)	430	7.49	1.96	2	10
Health problem in last month	430	0.41		0	1
Grandchild in house	430	0.19		0	1
Number of children	430	4.60	1.99	1	11
Number of children remitting	430	1.44	1.39	0	5
Child's age	430	23.95	9.99	15	88
Eldest child	430	0.44		0	1
Child's health	430	8.40	1.81	1	10
Child lives in city/abroad	430	0.30		0	1
Child married	430	0.62		0	1
Child daughter (not son)	430	0.60		0	1
Matrilineal heritage	430	0.23		0	1
Patrilineal heritage	430	0.44		0	1
Northern village (Mwankhunikira)	430	0.07		0	1
Northern village (Mwahenga)	430	0.28		0	1
Central village (Mkanda)	430	0.30		0	1

Table 5.6: Summary statistics for Respondent-Sibling remittance flows

Variable	Obs	Mean	Std. Dev.	Min	Max
Net remittances from sibling	2876	-18.30	340.99	-7503	7000
Received remittances from sibling	2876	0.29	0.46		1
Value of remittances from sibling	2876	58.66	226.21	0	7000
Sent remittances to sibling	2876	0.39	0.49		1
Value of remittances to sibling	2876	76.95	268.41	0	7503
Income	2876	275.16	1332.61	0	20000
Asset index (farm)	2876	0.13	1.43	-0.62	15.42
Asset indes (non-farm)	2876	0.28	1.61	-2.00	3.06
Education (years	2876	5.99	3.17	0	14
Age	2876	32.95	9.89	15	73
Married	2876	0.98	0.15		1
Household size	2876	3.91	2.15	1	15
Respondent eldest child	2876	0.18	0.38		1
Health (1-10)	2876	8.26	1.92	2	10
Health problem in last month	2876	0.29	0.45		1
Niece/nephew in house	2876	0.14	0.35		1
Sibling's age	2876	32.05	11.69	15	96
Sibling eldest child	2876	0.12	0.32		1
Sibling's health (1-10)	2876	8.23	1.91	1	10
Sibling lives abroad or in city	2876	0.26	0.44		1
Sister (not brother)	2876	0.50	0.50		1
Matrilineal heritage	2876	0.13	0.34		1
Patrilineal heritage	2876	0.53	0.50		1
Northern village (Mwankhunikira)	2876	0.11	0.31		1
Northern village (Mwahenga)	2876	0.35	0.48		1
Central village (Mkanda)	2876	0.35	0.48		1

5.3 RESULTS AND ANALYSIS

5.3.1 Respondents and their parents

Regression results for respondent-parent transfers are reported in Table 5.7 in the Appendix to this chapter. Net remittances from parents, shown in column 1 are decreasing in the asset index, that is, those with lower wealth receive more net remittances from their parents than wealthier respondents. This is consistent with parental altruism. The probits and Tobits in columns 2-5 which model likelihood and value of (the latent variable of) remittances from each side of the dyad separately reveal that this is largely driven by the fact that wealthier respondents are more likely to give and give more to their parents than their poorer counterparts. The altruism model illustrated in Chapter 2 shows that under altruism, transfers are increasing in the sender's income but Van Dalen et al. (2005), De la Brière et al. (2002) and Rapoport and Docquier (2006) note that this is consistent with both altruism and inheritance motivations.

The Tobit in column 5 shows that those who reported higher earned income actually give less to their parents than others. This might be explained in several ways; if those who earn higher income levels tend to be more asset-poor than others, then this group is likely to remit less to their parents and favour using earned income to build up their own asset base. However, descriptive statistics reveal a positive and significant correlation

between asset ownership and income ($r=0.1935$, $p<0.001$) suggesting an alternative explanation is likely. Under mental accounting, discussed in Chapter 2 and tested in Chapter 6, different sources of wealth are used for different purposes out of choice. It is possible that respondents choose to give to their parents out of asset wealth, but do not remit to their parents out of cash income. Indeed, higher cash income is actually associated with lower remittances sent to parents suggesting a negative marginal propensity to remit out of cash income. That is, money from other sources that would have been remitted is combined with money from high levels of cash income and used for household consumption, rather than being remitted. This prima facie evidence of mental accounting is investigated further in Chapter 6.

Net remittances from parents are higher for respondents who reported suffering from a health problem during the previous month. This is consistent with both altruistic motivations and insurance payouts or indemnities from parents to children. Having suffered from a health shock is of the correct positive sign but is (marginally) insignificant for both likelihood of receiving from parents (probit in column 2) and value of remittances received from parents (Tobit in column 3). Having suffered from a health shock has a negative but insignificant impact on remittance sent to parents.

Although there are no data on whether or not a parent recently suffered from a health problem, a parent's general health is negatively associated with likelihood of the respondent sending remittances (column 4), and is of the correct (negative) sign but insignificant for the value of remittances sent in column 5. This result is consistent with altruism (better parental health attracts lower remittances), or, possibly, insurance since overall parental health will include any recent shock as it is not possible to control for this using this data set.

Parents who have some education are more likely to remit and remit more than parents with no education. Parental education is likely to capture, in part, their wealth and social status. If this is the case, this is consistent with altruism on the part of parents, as described in the theoretical model in Chapter 2. Interestingly, parental education has no impact on either decision to remit or value of remittances sent by the respondent to their parents. This is expected to be positive under both co-insurance and inheritance motives.

Better educated respondents are more likely to receive remittances (column 2) from their parents and receive more (column 3). Combined with the fact that parents with education are more likely to remit, this is likely to capture the fact that better educated (and wealthier) parents are more likely to have better educated (and wealthier) children. Within this context remittances would then seen as a form of inter-generational wealth transfer encouraged by a bequeath motive[29].

A parent's age has no impact on remittances sent by the respondent. This is expected to be positive under the inheritance motivation and negative under co-insurance. Under altruism, it would have no direct impact. Remittances from parents to the respondent however follow an inverted U-shape in parental age. If parents remit for insurance purposes age is expected to be positive (as is the case) as older parents are likely to require more insurance due to the increased risk of a shock, and the square either positive or insignificant. The square is however negative and significant. One explanation might be that as parents get older they do indeed choose to remit more to the respondents as insurance premiums. Once they reach a certain age however, their ability to afford these premiums decreases. Turning points after which remittances from parents decline are between 36.8 years and 43.2 years in columns 1-3, perhaps making this explanation unlikely. As stated in Chapter 1 however, Malawian life expectancy is around 39 years (Morah, 2007; Conroy et al., 2006: p.65).

Net remittances from parents who live in the same village as the respondent tend to be lower than for those who live in another village. This is consistent with parents remitting for an insurance motivation – those who live in the same village make worse insurers following climatic shocks which impact on everyone in the village. They are likely however to make better insurers for idiosyncratic household shocks as indemnities can be accessed more quickly. This is discussed in more detail in Chapter 7. Respondents are more likely to remit (column 4) and remit more (column 5) to parents who live in the same village. This could be as a result of transaction costs of remitting to parents who live further afield. Equally, social pressure to support parents might be stronger when both live in the same village.

[29] Fan (2005) discusses intergenerational transfers in the context of the "survival of the gene".

The more heirs a parent has, the more likely respondents are to remit to them (column 4). Although there is no information on parental wealth, this is tentative evidence of an inheritance motivation for remitting since it may indicate competition amongst potential inheritors. Interestingly, parents with more heirs are also more likely to remit (column 2).

Respondents who receive remittances from their parents are more likely to remit in turn, and vice versa. A large proportion of transfer relationships are therefore bi-directional. This result is consistent with remittances serving as insurance or income pooling as part of a survival strategy. This result is in line with "balanced reciprocity as mutual insurance" discussed by Platteau (1997). Equally it is likely to capture, in part, any mutual social obligations to remit (Mauss, 1990).

Unsurprisingly, motivations for respondent-parent remittance flows are mixed. Nonetheless, there is strong support for altruistic giving in both directions. In addition, some results are also consistent with co-insurance motivations.

5.3.2 Respondents and their children

Regressions for respondent-child transfers are reported in Table 5.8 in the Appendix to this chapter. Net remittance receipts from children are decreasing in income. This is consistent with altruism on the part of the son/daughter. It is interesting to note however that wealth is insignificant. It could be therefore that respondents receive remittances from children as insurance indemnities from short-term income shocks rather than due to altruism which might be likely to respond more to assets. Income and assets are insignificant in both probit models, but turn significant in the Tobit model in column 5. Although the likelihood of sending remittances to a child is not affected by assets or income, the value of remittances sent is positively related to income and asset wealth. This is consistent with respondents acting altruistically towards their children, and giving to children out of both income and asset wealth. This is in contrast to parents, whom respondents appear to remit to only out of asset wealth.

Columns 1-3 show that net remittances from children (column 1), likelihood of receiving remittances (column 2), and value of remittances received from children (column 3) are all positively and significantly related to health. At the mean (around 7.5/10 in the regression), a unit increase in the respondent's health increases the likelihood of

receiving remittances from their children by around 3.4 per cent. Healthier respondents are more likely to receive and receive more remittances from their children. This is consistent with the co-insurance hypothesis with children remitting insurance premiums to their healthy parents – healthier respondents make better insurers. Having suffered from a health shock during the previous month is insignificant suggesting that whilst children are insuring themselves with respondents, they do not pay out insurance indemnities to them. In addition, the better the child's health, the lower net remittances respondents receive. This again is consistent with the hypothesis that children choose to insure themselves with their parents; parents in better health make better insurers, and children in better health are less likely to require their parents' insurance.

Relatedly, the better educated are respondents, the more likely and the more they receive from their children (columns 2 and 3). At the mean (4.6 years), an additional year of education increases the likelihood that a child will remit by around 1.9 per cent. The Tobit model (column 3) indicates that an additional year of education increases the value of the latent variable by around MK28. This is again consistent with the hypothesis that better educated respondents make better insurers.

Respondents receive less net remittances from their children if they look after their grandchildren. Although the data do not indicate to which son/daughter the grandchild belongs, the evidence indicates that remittances are not a payment for this service. Indeed, respondents who look after their grandchildren receive less than others. Although potentially initially surprising, this should not be unexpected within the Malawian context in which around 14 per cent of the population is HIV positive (Morah, 2007). HIV disproportionally affects those of working and child-bearing age and grandparents are often left to care for the children (Conroy et al., 2006). This result could therefore be interpreted as evidence of altruism of respondents towards their grandchildren.

The coefficients on number of children and number of children remitting in the remittance receipt models in columns 2 and 3 are of particular interest. The more children a respondent has (living outside of the household), the less likely s/he is to receive remittances from any one of the children and the less s/he receives in terms of value. At the mean number of children living away from home (around 4.6) increasing the

number of children by one reduces the likelihood of receiving remittances from any one of them by around 7.3 per cent. Agarwal and Horowitz (2002) suggest that this can be interpreted as evidence of altruism as the more children there are to look after the parents the less responsibility there is on any one of them to do so. Both Agarwal and Horowitz (2002) and Naufal (2008) find similar results and interpret this as evidence of altruism.

This study goes one step further however. Unlike Agarwal and Horowitz (2002) and Naufal (2008), this study is able to identify how many children are actually remitting. The results show that the more children there are actually remitting, the more likely and the more money the respondent receives in remittances from any one of them. The marginal effect at the mean (around 1.4 remitting children) is particularly large at around 29.6 per cent, that is increasing the number of children remitting by one will increase the likelihood that the respondent will receive remittances from any other child by nearly 30 per cent. The positive coefficient on this variable suggests that there is competition amongst children to (be seen to) assist their parents.

This is consistent with inheritance motivations to remit since, as previously discussed in Malawi, inheritance does not automatically go to the eldest child, but is decided by a committee of surviving senior relatives on the basis of who is seen to have fulfilled their duty towards their parents (Takane, 2007). To assess this hypothesis further, the number of children remitting is interacted with the asset index. A positive coefficient is expected on this since the children will be prepared to compete more strongly the more they stand to benefit. This coefficient is however, insignificant.

There is a lower degree of reciprocity between respondents and their children than between respondents and their parents. The probit model in column 4 indicates that respondents who receive are more likely to give, however there is no evidence that children reciprocate with this variables being insignificant in columns 2 and 3.

Eldest children are more likely to remit to respondents, and remittance value in the Tobit in column 3 is positive but marginally insignificant. This might be interpreted as evidence of eldest children safeguarding inheritance in other cultures, but is unlikely to be the case in Malawi for reasons previously discussed. A control for the child's age is used so this

variable is unlikely to capture issues related to older children being more established economically. Instead, this may capture some of the social responsibility assigned to elder children vis-à-vis the respondents.

Perhaps surprisingly, married children are more likely to give and give more to respondents than their unmarried counterparts. It seems likely that married children have more responsibility towards their new family and are therefore less able to remit than their unmarried counterparts making this an unlikely result. However, it is also possible that wealthier children are able to attract a partner more easily, and that these also remit more to respondents. In addition, respondents are also less likely to send and send less to their married children. If children's marital status and wealth are positively correlated, then this result is consistent with respondents behaving altruistically towards their children: wealthier children receive less.

The dummy indicating whether or not the child lives in a Malawian city or abroad is consistently insignificant. This is expected to be positive under the co-insurance hypothesis as living in areas where income patterns are uncorrelated helps to reduce risk if incomes are partly pooled.

Respondent-children transfers show evidence of children insuring their parents against income, but not health shocks. Children exhibit both altruism and inheritance motivations. No one motivation appears to dominate in this case however.

5.3.3 Respondents and their siblings

Results from respondent-sibling regressions are presented in Table 5.9 in the Appendix to this chapter. Net remittances from siblings exhibit the opposite pattern to those of children. They are decreasing in asset wealth of the respondent but increasing in income. Other regressions show that this is driven by remittances sent by respondents to their siblings. Respondents appear to share their (long term asset) wealth with siblings, but not their short term income, with a similar mental accounting explanation as that suggested for parents seeming plausible.

Net remittances from siblings increase as the respondents' health declines suggesting siblings remit for altruistic motives. In addition, siblings are more likely to remit to respondents who have recently suffered from a health problem – having suffered from a

health shock in the previous month increases the likelihood of having received remittances from a sibling by around 6.7 per cent compared with not having had such a shock. Column 3 indicates a positive association between having suffered from a health shock and the value received, but this is insignificant. This is consistent with insurance payouts or altruistic motivations. Interestingly, respondents who reported suffering from a recent health problem were 5.9 per cent more likely to send remittances to their siblings. This could be an indication that siblings provided help to sick respondents, but that respondents also "repaid" the help within a fairly short time period. The distinction between gifts and loans may not be clear. Udry (1990) for example finds that repayment of loans in rural northern Nigeria is conditional upon the borrower's and lender's economic situation. A similar situation may exist in rural Malawi.

Both respondents and their siblings are more likely to remit the better their own health is, with an increase in one unit of respondent's (sibling's) subjective health increasing the likelihood of his/her remitting to a given sibling (the respondent) by around 2.2 (1.5) per cent at the mean. Respondents are also more likely (1.8 per cent at the mean) to remit to their siblings and remit more as the sibling's health declines. This is consistent with altruism on the part of the respondent.

As with parents, there appears to be a great deal of reciprocity with those giving to siblings more likely to receive from them, and vice versa. Receiving remittances from a sibling increases the likelihood that a respondent will remit to the same sibling by around 21.7 per cent, whilst remitting to the sibling increases the likelihood of receiving by around 19 per cent. This is consistent with co-insurance/income pooling motivations for remitting.

Net remittances from siblings residing in a city or abroad are higher than from those residing in rural Malawi. The Tobit model in column 3 indicates that total remittances received from siblings living in cities or abroad are higher than from other siblings, but remittances sent to siblings (and the likelihood of remitting to them) are lower. Since such siblings are likely to earn more, this could be evidence of altruism (they give because they can afford to do so), or of a family survival strategy (sending some people to work in the city and pooling income), or repayment of implicit loans to fund the migration. Alternatively the transaction costs involved in such transfers are prohibitive for rural

Malawians but not for those residing in cities or abroad. Without additional information, it is not possible to untangle this further.

The age of the sibling and its square are highly significant in all regressions. There is an inverted U-shaped relationship between sibling's age and remittances received from the sibling, but a U-shaped between the sibling's age and remittances sent to the sibling. Siblings remit more to respondents as they get older but at a declining rate. Turning points based on columns 1-3 are estimated at between 47.1 years and 64.2 years. By contrast, as their siblings age, respondents remit less but at a decreasing rate. Estimated turning points fall within the same region. Descriptive statistics reveal that the respondents and their siblings have similar mean ages with respondents being on average 33.3 years (standard deviation of 10.6) and their siblings being on average 31.8 years (standard deviation 11.5), it is not clear what is driving this. The data reveal only one socio-economic characteristic for which respondents differ vastly from their siblings; that of residency. The sampling surveyed rural households ensuring all respondents were rural, but around a quarter of siblings live either abroad or in Malawian cities. This difference is potentially revealing. If income is flatter over the lifecycle for rural dwellers than for urban dwellers (that is, if urban Malawian lifecycle earnings follow a more western pattern than their rural counterparts), then urban earnings peak in mid to late life and then decline. During the peak, urban Malawians might send remittances back to their village. However, during earlier and later life, during which urban incomes are low, rural siblings financially support urban brothers and sisters. Without further information on urban income dynamics, it is not possible to ascertain whether this is the case. If true, then these results might be due to altruism, or an implicit income sharing agreement.

It is interesting though that receiving remittances increases likelihood of sending remittances and vice versa. Thus, an implicit agreement could be kept alive by constant mutual gift-giving with the net amount received by the respondent from their urban sibling changing from negative to positive and then back to negative throughout the lifecycle.

Overall Respondent-Sibling remittance flows reveal a strong altruistic component with some evidence of co-insurance.

5.3.4 Comparing and contrasting motivations

The coefficients on the wealth variables show slightly different motivations to remit for each group. There is some indication that both parents and children behave altruistically towards the respondents with net remittances increasing as wealth decreases. Remittances from respondents to all others are increasing in wealth. This is consistent with altruism or seeking to insure themselves on the part of the respondents.

Net remittances from parents and likelihood of receiving remittances from a sibling both increase following a health shock offering evidence that parents and siblings behave altruistically towards respondents. This result is also consistent with the co-insurance hypothesis.

Receipt of remittances from children increase as the reliability of the respondents as insurers improves; respondents with more education and those in better health are more likely to receive remittances from their children. In addition, as the child's risk of a shock declines (as his/her health improves) remittances to the respondents decrease. It appears that remittances from children are, in part, insurance premiums. This is not true of respondents with respect to their own parents however. In this case, as a parent's health improves the respondent is less likely to send remittances, and to send less. Although age is not significant in any of the relevant models, one possible explanation is that respondents are potentially good insurers due to the fact that working age adults were purposively targeted. Respondents' parents are unlikely to make reliable insurers due to their age. Respondents should therefore turn elsewhere for insurance. One possible option is a sibling.

Respondents behave overwhelmingly altruistically towards their siblings however. In particular, they remit more as the sibling's health declines – the opposite result to that expected if respondents sought to insure themselves with their siblings. Respondents are also more likely to give to a parent as the parent's health declines. Health has no impact on remittance flows from respondents to their children.

There is strong evidence that remittances are bi-directional in the case of siblings and parents. This is likely to capture a degree of risk pooling, but might also capture other

social reasons for gift-giving. In the case of children, the respondents appear to respond to their children's gifts, but the opposite is not the case.

There is tentative evidence that remittances from respondents to their parents include an element of an inheritance motive with remittances increasing in the number of heirs a parent has, and in the parent's education (where education is likely to be positively correlated with wealth). Other explanations are possible here though, as previously discussed. Although not conclusive, there is stronger evidence that children compete for a parent's inheritance (or other non-tangible things a parent can provide such as affection or access to networks) through remittances, with remittances increasing in the number of children remitting. This result is the opposite to that which would be expected under pure altruism, as modelled in Chapter 2.

Although included in all regressions, the variable indicating whether or not the household looks after a child of the remitter is not significant in any probit or Tobit models. This might be because the variable is not sensitive enough, indicating only whether the respondent's household looks after a nephew/niece/sibling/grandchild, and not to whom the child belongs. Alternatively, it could be that remittances in this context are simply not payment for this service. It seems likely that there are cases in which remittances are payments for this service, but equally it could be that looking after the child is due to the extreme poverty of the other household, so that seeing a resulting increase in remittances is unlikely.

Household wealth in terms of the asset index and income is insignificant across all regressions for remittances received. This is in contrast to Lucas and Start (1985) and De la Brière et al. (2002) who find a positive relationship, and Agarwal and Horowitz (2002) VanWey (2004) and Van Dalen et al. (2005) who find a negative relationship. Respondents' wealth appears to be more important in their own remittance choices rather than those of others, in all cases.

In all cases, males are more likely to send remittances and to remit more but they are significantly less likely than females to receive remittances from their parents. Daughters are less likely to remit and remit less than sons. These results reflect the male control of wealth in Malawi, despite a matrilineal dominance in most regions. Matrilineal and

patrilineal groups receive more from their children than the mixed group, and the patrilineal group receives more from siblings than other groups, other things being equal. Tribal differences have been evaluated by Mtika and Doctor (2000) using this data set, and are studied with respect to the respondent-child relationship in section 5.4 below.

5.4 AN EXTENSION: CHILD REMITTANCES BY GENDER AND TRIBE

The data allow the user to identify households by tribal origin, and to focus separately on remittance flows from sons and daughters to mothers and fathers. This section estimates Tobit models for the value of remittances sent from children to their parents for each of the following relationships: son to father (male respondent); daughter to father; son to mother (female respondent); and daughter to mother. The child-respondent relationship is focused on since there exists information on the respondents' wealth and there is potential for remittances to be partly motivated by inheritance. Motivations for remitting (and social responsibilities) are likely to differ by gender according to tribal heritage. Thus, respondent wealth is entered separately for each of the three tribal groups in order to identify any differences in the behaviour of sons and daughters with respect to their parents' wealth depending upon inheritance customs.

The regressions are presented in Table 5.10 in the appendix to this chapter, and several results of interest are discernable. In matrilineal tribes, male remittances to the mother increase as her wealth decreases. However, male remittances to the father increase as the father's wealth increases. The opposite results can be found for patrilineal tribes. That is, poorer fathers attract more remittances, but richer mothers attract more remittances.

These results are consistent with the idea that sons give out of altruism, or have a social responsibility to give to the parent who tends to control the household wealth when the parent is poor. Giving to the parent who tends to control less of the household resources increases as s/he becomes richer, suggesting these remittances are more motivated by the hope of inheritance. Although the data do not contain relevant information, it is possible that, in matrilineal systems, the father's wealth is available upon his death to any child, whilst in patrilineal systems, any wealth the mother owns is similarly available to any child, encouraging competition.

No coefficients on asset indexes are significant for remittances from daughters suggesting that daughters are less motivated by this variable than their brothers, and that their behaviour does not differ depending upon tribal origin.

Although other coefficients are not permitted to differ by tribal origin, several results are worth noting. Remittances from sons are negatively associated with either parent having suffered from a recent health shock, and this is significant in the case of remittances to fathers. Sons do not therefore insure health shocks. Conversely, daughters appear to give to either parent when they suffer from a health shocks.

5.5 CONCLUSIONS AND FURTHER EXTENSIONS

Motivations to remit are difficult to untangle due to the fact that a single individual can have multiple motivations, and one motivation might actually be complementary to another. Studying motivations within the context of groups of individuals is therefore especially difficult, and the results of this chapter reflect the mixed motivations to remit. Despite this, the results indicate a strong element of altruism in the motivations to remit for all groups. The evidence for altruism is strongest between respondents and their parents and respondents and their siblings. Children appear to remit, in part, to insure themselves with the respondents. The strong evidence of reciprocity might also be a reflection of a co-insurance motive.

In addition to these results, there is weak evidence for some inheritance motivations, but little evidence that remittance flows in this context can be interpreted as payment for the service studied – looking after the sender's child.

Finally, prima facie evidence of mental accounting is uncovered with respondents appearing to share wealth in some forms with others, but not wealth in other forms. The mental accounting hypothesis and the uses of remittance receipts is studied using a different data set in Chapter 6.

The results offer several potential extensions. One interesting addition would be to study separately the motivations for remitting depending upon the geographical source of the remittances. That is, to study separately motivations depending upon whether the remitter lives in the same village as the respondents or whether they live further afield. A second extension would lie in focusing on the child-respondent relationship and separate

remittance flows by sons and daughters. This could further be broken down by tribe given that some tribes are matrilineal, some patrilineal and some mixed making any inheritance motivations different for sons and daughters in each tribe. This is done in the present study by allowing the coefficient on asset ownership to differ depending upon whether the household is from a matrilineal, patrilineal or mixed tribe. There are not, unfortunately, enough data in this set to permit allowing all coefficients to differ by tribal origins. Finally, it is possible to use only households for which data on the male and female exist and include both sets of characteristics, ensuring a more household level study.

5.6 APPENDIX

Table 5.7: Respondent-Parent remittance flows

	Net remittances received from parent	Received remittances from parent (1=yes)	Value of remittances from parent	Sent parent remittances (1=yes)	Value of remittances sent to parent
	(1) Robust OLS	(2) Probit	(3) Tobit	(4) Probit	(5) Tobit
Income	0.007	-0.000	-0.022	-0.000	-0.029***
	(1.347)	(-0.986)	(-1.257)	(-1.556)	(-3.025)
Asset index (farm)	-22.725	-0.069	-16.322	0.063	29.257**
	(-1.557)	(-1.644)	(-0.936)	(1.427)	(2.342)
Asset index (non-farm)	-37.262**	0.030	-2.441	0.061	47.103***
	(-2.561)	(0.920)	(-0.150)	(1.637)	(3.025)
Education	1.738	0.062***	30.682***	-0.036*	9.231
	(0.188)	(3.605)	(3.364)	(-1.858)	(1.062)
Age	-1.980	-0.010	4.766	0.000	5.830
	(-0.220)	(-0.304)	(0.386)	(0.012)	(0.572)
Age square	0.044	-0.000	-0.137	-0.000	-0.108
	(0.324)	(-0.220)	(-0.729)	(-0.046)	(-0.677)
Male ‡	-7.428	-0.480***	29.235	0.682***	247.020***
	(-0.154)	(-3.626)	(0.467)	(4.949)	(5.339)
Married	-478.170	0.348	-502.684	0.659*	123.774
	(-1.618)	(1.124)	(-1.376)	(1.926)	(1.202)
Household size	-16.636*	-0.049*	-8.628	-0.004	19.163*
	(-1.830)	(-1.768)	(-0.709)	(-0.146)	(1.778)
Respondent eldest child	8.789	0.074	25.688	0.051	20.249
	(0.176)	(0.639)	(0.446)	(0.430)	(0.413)
Health (1-10)	6.748	0.033	11.142	0.040	-0.430
	(0.728)	(1.100)	(0.969)	(1.229)	(-0.039)
Health problem in last month	53.859*	0.195	60.140	-0.046	-52.851
	(1.679)	(1.610)	(1.436)	(-0.345)	(-1.373)
Sibling in house	64.391	0.063	-18.262	0.114	-83.139*
	(1.435)	(0.477)	(-0.323)	(0.702)	(-1.719)
Given remittances to parent		0.661***	245.675***		
		(6.618)	(3.857)		

Received remittances from parent				0.653***	98.823***
				(6.651)	(2.776)
Parent's age	3.585	0.022**	9.391**	-0.010	-1.997
	(1.312)	(2.438)	(1.984)	(-1.101)	(-0.594)
Parent's age square	-0.041	-0.000**	-0.123**	0.000	0.020
	(-1.296)	(-2.544)	(-2.232)	(1.445)	(0.547)
Parent's health	-0.879	0.017	4.762	-0.069***	-9.482
	(-0.136)	(0.857)	(0.546)	(-3.213)	(-1.309)
Parent lives in same village	-84.438**	0.144	-10.092	0.554***	119.718***
	(-2.324)	(1.483)	(-0.225)	(4.795)	(3.238)
Parent has some schooling	39.246	0.223**	111.516***	-0.006	5.757
	(1.054)	(2.124)	(2.646)	(-0.062)	(0.129)
Number of heirs parent has	0.873	0.032**	7.120	0.030*	4.828
	(0.212)	(1.967)	(1.146)	(1.662)	(0.901)
Mother(not father) is receiver/sender ‡	-151.606**	0.158	-74.225	0.126	95.845*
	(-2.472)	(1.248)	(-0.954)	(1.020)	(1.948)
Matrilineal heritage †	-26.418	0.122	22.384	-0.790***	-123.757
	(-0.392)	(0.642)	(0.308)	(-4.047)	(-1.549)
Patrilineal heritage †	-6.595	0.199	-102.043	0.008	-105.696
	(-0.097)	(1.075)	(-1.011)	(0.042)	(-1.472)
Northern village (Mwankhunikira) ⁺	-58.019	-0.485*	-34.805	-0.511*	26.398
	(-0.568)	(-1.803)	(-0.331)	(-1.828)	(0.214)
Northern village (Mwahenga) ⁺	-16.800	-0.501**	12.386	-0.134	68.606
	(-0.180)	(-2.222)	(0.114)	(-0.580)	(0.727)
Central village (Mkanda) ⁺	25.401	-0.150	-1.067	-0.415**	-81.220
	(0.509)	(-0.900)	(-0.017)	(-2.406)	(-1.397)
Mother - Female remittance flow ‡	164.198**	-0.211	80.066	0.370**	10.353
	(2.486)	(-1.403)	(1.044)	(2.414)	(0.195)
Constant	385.078*	-1.373**	-255.275	-0.703	-365.624
	(1.658)	(-1.973)	(-0.848)	(-0.900)	(-1.454)
Standard error of regression			536.491***		450.169***
			(6.297)		(8.582)
N (censored)	1083	1083	1083 (526)	1083	1083 (381)
(Pseudo) r2	0.083	0.114	0.013	0.161	0.016
Clusters	483	483	483	483	483
Goodness of fit	F: 2.889	Chi 2: 148.590	F: 1.863	Chi 2: 203.302	F: 3.724

*Notes: t-stats in parentheses below coefficients. *, ** and *** indicate significance at 10%, 5% and 1% respectively. † excluded dummy is Mixed Heritage (Chewa tribe); ‡ indicated dummy variables capture all remittance flow relationships between them (excluded Father-Male remittance flow); ⁺ excluded village dummy is Southern Village (Kalembo).Table reports coefficients(not marginal effects) for all Probit and Tobit models.*

Table 5.8: Respondent-Children remittance flows

	Net Remittances Received from Child	Received Remittances from Child (1=yes)	Value of Remittances from Child	Gave Remittances to Child (1=yes)	Value of Remittances to Child
	(1) Robust OLS	(2) Probit	(3) Tobit	(4) Probit	(5) Tobit
Income	-0.063***	-0.000	-0.011	0.000	0.054***
	(-5.450)	(-0.350)	(-0.369)	(0.578)	(3.217)
Asset index ††	-31.560	-0.007	-31.707		
	(-0.967)	(-0.083)	(-0.967)		
Asset index (farm)				0.116	63.068**
				(1.436)	(2.093)
Asset index (non-farm)				-0.005	7.730
				(-0.076)	(0.282)
Education	3.815	0.064*	29.003**	-0.006	9.985
	(0.374)	(1.930)	(2.154)	(-0.197)	(0.795)
Age	0.769	-0.002	-8.666	-0.047	-10.963
	(0.035)	(-0.022)	(-0.355)	(-0.560)	(-0.299)
Age square	0.023	-0.000	-0.009	0.000	-0.015
	(0.098)	(-0.182)	(-0.037)	(0.205)	(-0.039)
Male ‡	-99.572	0.159	116.401	0.411	199.189*
	(-1.007)	(0.660)	(0.881)	(1.394)	(1.722)
Married	54.570	-0.715**	-63.622	1.133***	404.216**
	(0.636)	(-2.170)	(-0.566)	(2.785)	(2.299)
Household size	15.529	0.078	38.944	-0.033	-3.903
	(0.809)	(1.541)	(1.572)	(-0.718)	(-0.163)
Health (1-10)	35.574**	0.088**	34.675**	-0.016	-28.947
	(2.470)	(2.308)	(2.081)	(-0.304)	(-1.394)
Health problem in last month	66.623	0.199	167.573	-0.199	-74.805
	(0.829)	(1.066)	(1.457)	(-1.073)	(-0.847)
Grandchild in house	-186.738**	-0.196	-101.821	0.112	143.362
	(-2.185)	(-0.722)	(-0.995)	(0.427)	(1.290)
Given remittance to child		-0.087	-73.483		
		(-0.531)	(-1.121)		

Received remittances from child				0.327**	1.096
				(2.149)	(0.018)
Number of children	-7.365	-0.215***	-35.756**	0.078	10.380
	(-0.351)	(-3.437)	(-2.210)	(1.511)	(0.372)
Number of children remitting	57.762**	0.841***	224.886***		
	(2.251)	(9.961)	(3.471)		
Number children remitting*Asset index	-6.818	-0.016	9.228		
	(-0.469)	(-0.283)	(0.574)		
Child's age	-2.707	0.073*	24.633	-0.033	8.052
	(-0.198)	(1.736)	(1.474)	(-0.926)	(0.515)
Child's age square	0.046	-0.001*	-0.209	0.000	-0.078
	(0.381)	(-1.712)	(-1.408)	(1.046)	(-0.559)
Eldest child	-12.499	0.412*	115.390	0.152	67.992
	(-0.201)	(1.895)	(1.517)	(0.927)	(0.961)
Child's health	-24.444**	0.024	-20.433	-0.003	27.701*
	(-2.315)	(0.441)	(-1.083)	(-0.075)	(1.756)
Child lives city/abroad	-11.353	-0.236	-28.035	-0.223	-9.205
	(-0.147)	(-1.255)	(-0.316)	(-1.214)	(-0.123)
Child married	173.701**	0.813***	332.894**	-0.342*	-213.014**
	(2.315)	(3.127)	(2.022)	(-1.917)	(-2.360)
Child daughter (not son) ‡	-48.032	-0.620**	-199.928**	0.012	34.566
	(-0.709)	(-2.455)	(-2.383)	(0.062)	(0.383)
Matrilineal heritage †	-4.333	0.543**	147.043	-0.307	-26.153
	(-0.049)	(2.098)	(1.529)	(-0.948)	(-0.204)
Patrilineal heritage †	150.050*	0.288	282.936*	0.339	42.837
	(1.709)	(1.060)	(1.917)	(1.156)	(0.477)
Northern village (Mwankhunikira) +	-543.996***	-0.873	-448.529**	-0.099	359.716*
	(-2.979)	(-1.571)	(-1.980)	(-0.232)	(1.660)
Northern village (Mwahenga) +	-138.781	-0.228	-126.777	-0.469	10.891
	(-1.248)	(-0.841)	(-0.902)	(-1.297)	(0.111)
Central village (Mkanda) +	-84.811	-0.154	-64.259	-0.083	74.216
	(-1.170)	(-0.591)	(-0.577)	(-0.296)	(0.846)
Daughter - Mother remittance flow ‡	-49.813	0.372	59.683	0.333	99.883
	(-0.484)	(1.218)	(0.568)	(1.164)	(0.737)
Constant	-327.070	-2.936	-1140.232*	1.280	-223.096
	(-0.694)	(-1.540)	(-1.786)	(0.625)	(-0.290)

Standard error of the regression			510.692***		508.374***
			(3.323)		(6.952)
N (censored)	430	430	430	430	430
(Pseudo) r2	0.1976	0.394	0.051 (270)	0.101	0.023 (190)
Clusters	144	144	144	144	144
Goodness of fit	F: 10.345	Chi 2: 251.285	F: 2.981	Chi 2: 75.163	F: 6.079

*Notes: t-stats in parentheses below coefficients. *, ** and *** indicate significance at 10%, 5% and 1% respectively. † excluded dummy is Mixed Heritage (Chewa tribe); ‡ indicated dummy variables capture all remittance flow relationships between them (excluded Son-Male remittance flow); ⁺ excluded village dummy is Southern Village (Kalembo); †† A pooled asset index is included in some regressions due to the Asset*Remitters interaction term. Results do not differ substantially if separate farm and non-farm asset indexes are entered. Table reports coefficients(not marginal effects) for all Probit and Tobit models.*

Table 5.9: Respondent-Sibling remittance flows

	Net remittances received from sibling	Received remittances from sibling (1=yes)	Value of remittances from sibling	Sent remittances to sibling	Value of remittances sent to sibling
	(1) Robust OLS	(2) Probit	(3) Tobit	(4) Probit	(5) Tobit
Income	0.011***	0.000	0.010	-0.000***	-0.033***
	(2.816)	(0.888)	(0.974)	(-3.451)	(-3.068)
Asset index (farm)	-6.962	0.035	13.948	-0.011	10.841
	(-0.896)	(1.505)	(1.423)	(-0.455)	(0.736)
Asset index (non-farm)	-10.916*	-0.043*	-14.806	0.075***	33.674***
	(-1.784)	(-1.833)	(-1.479)	(3.382)	(2.795)
Education	-2.171	-0.009	3.455	0.031**	16.687***
	(-0.634)	(-0.778)	(0.561)	(2.506)	(2.824)
Age	0.447	-0.030	-16.588	-0.004	-7.566
	(0.094)	(-1.353)	(-1.576)	(-0.167)	(-0.892)
Age square	-0.052	0.000	0.138	0.000	0.171
	(-0.879)	(0.855)	(1.060)	(0.771)	(1.500)
Male ‡	-32.353	0.019	26.672	0.249***	128.396***
	(-1.195)	(0.199)	(0.584)	(2.739)	(3.296)
Married	-43.964	-0.085	-65.774	0.127	57.637
	(-0.819)	(-0.387)	(-0.610)	(0.504)	(0.580)
Household size	-1.218	-0.017	4.423	-0.003	9.626
	(-0.257)	(-0.909)	(0.535)	(-0.155)	(1.366)
Respondent eldest child	-10.254	-0.116	-0.427	0.038	43.107
	(-0.348)	(-1.234)	(-0.010)	(0.428)	(0.950)
Health (1-10)	-9.204**	0.006	-3.023	0.058***	25.751***
	(-2.203)	(0.272)	(-0.325)	(2.685)	(2.925)
Health problem in last month	-8.812	0.194**	47.270	0.154*	47.453
	(-0.481)	(2.152)	(1.308)	(1.771)	(1.480)
Nephew/Niece in house	36.670	0.008	31.465	0.010	-16.615
	(1.278)	(0.072)	(0.550)	(0.108)	(-0.460)
Given remittances to sibling		0.563***	199.164***		
		(9.175)	(5.304)		
Received remittances from sibling				0.585***	187.620***
				(9.338)	(6.033)
Sibling's age	8.211***	0.100***	44.126***	-0.050***	-14.441***
	(3.627)	(7.235)	(4.960)	(-3.977)	(-2.638)

Sibling's age square	-0.065**	-0.001***	-0.472***	0.000***	0.115*
	(-2.349)	(-5.890)	(-4.514)	(2.990)	(1.775)
Eldest sibling	-24.590	0.055	-19.817	-0.046	-13.680
	(-1.294)	(0.633)	(-0.584)	(-0.513)	(-0.364)
Sibling's health	6.461*	0.045***	18.981**	-0.048***	-15.836**
	(1.835)	(2.767)	(2.530)	(-3.011)	(-2.163)
Sibling lives abroad or in city	82.477***	0.071	109.691***	-0.610***	-200.600***
	(4.601)	(0.972)	(3.075)	(-8.474)	(-4.263)
Sister ‡	3.352	-0.109	-75.184**	-0.146*	-85.267**
	(0.177)	(-1.337)	(-2.113)	(-1.796)	(-2.450)
Matrilineal heritage †	59.033*	-0.007	18.968	-0.123	-98.337
	(1.839)	(-0.046)	(0.285)	(-0.822)	(-1.602)
Patrilineal heritage †	34.014*	0.213*	102.160**	-0.040	-40.518
	(1.804)	(1.768)	(2.132)	(-0.317)	(-0.839)
Northern village (Mwankhunikira) ⁺	31.070	-0.091	-24.076	0.014	-15.710
	(0.775)	(-0.538)	(-0.331)	(0.088)	(-0.224)
Northern village (Mwahenga) ⁺	-27.945	-0.154	-82.149	-0.071	-4.788
	(-0.869)	(-1.055)	(-1.315)	(-0.484)	(-0.075)
Central village (Mkanda) ⁺	17.883	-0.196	-78.806	-0.101	-71.220
	(0.751)	(-1.560)	(-1.571)	(-0.776)	(-1.248)
Sister-Female remittance flow ‡	-11.143	0.077	47.816	0.256**	103.045**
	(-0.385)	(0.670)	(0.943)	(2.224)	(2.147)
Constant	-102.571	-2.261***	-1025.598***	0.159	-134.272
	(-0.813)	(-4.402)	(-3.978)	(0.306)	(-0.649)
Standard error of regression			474.482***		468.252***
			(5.721)		(6.335)
N (censored)	2876	2876	2876 (2028)	2876	2876 (1749)
(Pseudo) r2	0.041	0.076	0.016	0.087	0.015
Clusters	540	540	540	540	540
Goodness of fit	F: 2.562	Chi 2: 182.937	F: 2.846	Chi 2: 244.848	F: 2.771

*Notes: t-stats in parentheses below coefficients. *, ** and *** indicate significance at 10%, 5% and 1% respectively. † excluded dummy is Mixed Heritage (Chewa tribe); ‡ indicated dummy variables capture all remittance flow relationships between them (excluded Brother-Male remittance flow); ⁺ excluded village dummy is Southern Village (Kalembo). Table reports coefficients(not marginal effects) for all Probit and Tobit models..*

Table 5.10: A focus on Child to Respondent remittance flows

	Tobit models: value of remittances from children to respondents			
	Son to Male	Daughter to Male	Son to Female	Daughter to Female
Income	0.071	-0.151	-0.431	-0.011
	(0.696)	(-0.802)	(-0.996)	(-0.286)
Asset index*Matrilineal	237.393*	19.213	-272.276**	-11.714
	(1.815)	(0.235)	(-2.387)	(-0.313)
Asset index*Patrilineal	-109.665*	-101.613	203.197**	0.784
	(-1.724)	(-1.291)	(2.215)	(0.041)
Asset index*Mixed heritage	29.394	144.605	-415.644**	12.800
	(0.611)	(1.429)	(-2.304)	(0.394)
Education	19.915	31.384	113.195***	-12.254
	(0.745)	(1.080)	(3.383)	(-1.103)
Age	-76.626*	-179.847*	18.402	-11.541
	(-1.767)	(-1.671)	(0.220)	(-0.265)
Age square	0.845*	1.428	-0.226	0.163
	(1.966)	(1.514)	(-0.219)	(0.346)
Married			-206.675	-13.450
			(-0.895)	(-0.173)
Household size	-46.900	120.605*	72.977	1.837
	(-1.525)	(1.825)	(1.510)	(0.124)
Health (1-10)	16.426	58.540	-5.884	1.548
	(0.626)	(1.407)	(-0.159)	(0.147)
Health problem in last month	-584.671***	396.727*	-138.912	98.048**
	(-2.735)	(1.878)	(-0.718)	(2.077)
Given remittances to child	46.572	-20.822	-282.703*	-25.592
	(0.434)	(-0.167)	(-1.736)	(-0.483)
Grandchild in house	-74.094	-279.507	-475.007	-206.630**
	(-0.444)	(-0.630)	(-1.357)	(-2.320)
Number of children	-29.404	-34.113	-249.810***	5.829
	(-0.951)	(-0.600)	(-3.457)	(0.404)
Number of children remitting	285.697***	334.869**	352.500***	92.501***
	(4.058)	(2.540)	(3.772)	(4.083)
Child's age	31.372	24.386	155.455***	62.003*
	(1.599)	(0.707)	(2.833)	(1.729)

Child's age square	-0.299*	-0.187	-1.369**	-1.021
	(-1.677)	(-0.566)	(-2.192)	(-1.623)
Eldest child	126.343	88.908	-110.383	101.844*
	(1.372)	(0.523)	(-0.811)	(1.739)
Child's health	23.166	35.953	-138.076***	3.183
	(0.865)	(0.887)	(-4.550)	(0.292)
Child lives city/abroad	-21.982	197.989	-679.661***	-65.131
	(-0.182)	(0.962)	(-2.799)	(-0.774)
Child married	8.614	477.372	17.663	-13.917
	(0.061)	(1.355)	(0.131)	(-0.186)
Matrilineal heritage †	457.541**	299.834	-197.764	84.412
	(2.532)	(1.309)	(-0.842)	(0.983)
Patrilineal heritage †	154.743	589.799*	82.171	25.218
	(0.690)	(1.681)	(0.343)	(0.275)
Northern village (Mwankhunikira) ⁺	-1041.949***	-756.563		-216.571
	(-2.742)	(-1.501)		(-1.541)
Northern village (Mwahenga) ⁺	84.917	-327.913		54.921
	(0.408)	(-1.213)		(0.682)
Central village (Mkanda) ⁺	39.121	-125.151	117.603	9.321
	(0.287)	(-0.566)	(0.528)	(0.107)
Northern village ⁺			-858.933***	
			(-3.174)	
Constant	474.710	1862.114	-1521.802	-978.207
	(0.499)	(0.812)	(-1.000)	(-1.024)
Standard error of the regression	235.263***	710.121**	280.915***	150.137***
	(6.790)	(2.490)	(5.414)	(5.695)
N	90	152	84	104
Pseudo r2	0.104	0.060	0.144	0.109
F	14.074	6.617	45.453	7.851
Censored	48	103	51	68

*Notes: t-stats in parentheses below coefficients. *, ** and *** indicate significance at 10%, 5% and 1% respectively. † excluded dummy is Mixed Heritage (Chewa tribe);); ⁺ excluded village dummy is Southern Village (Kalembo).*

6 MENTAL ACCOUNTING AND REMITTANCES

6.1 INTRODUCTION

This chapter extends the analysis of the previous chapter from the motivations for remitting to how the remittance receiver perceives and uses this income source. The chapter draws on the economic psychology literature discussed in Chapter 2 to show that remittance receipts are not simply combined with other income, but rather, are used for specific purposes. Otherwise put, equally liquid assets are shown to be not fungible. Male and female headed households are analysed separately, and are shown to have different consumption preferences. However, in both cases, remittance income exhibits a lower marginal propensity to consume than other income sources. In addition, despite their differences, male and female headed households concur in one key aspect: remittances are used to fund education.

6.2 METHODOLOGY

This chapter extends Levin's (1998) analysis to include equally liquid income from a variety of sources and tests the mental accounting hypothesis for a developing country, Malawi. Formally, a household's consumption of good g, C_g , is a function of its *J* income sources, Y, and its ownership of K categories of assets, A:

$$C_g = C_g(Y_1, Y_2, \ldots, Y_J ; A_1, A_2, \ldots, A_K) \quad \textbf{(6.1)}$$

In addition to allowing MPC out of each wealth category to differ as in Levin (1998), the MPC out of different, equally liquid income sources are also allowed to differ. As required by the behavioural lifecycle model, the different MPC results, at least in part, from internally (not externally) imposed constraints. The varying MPC are due to behavioural reasons such as mental accounting. More specifically agents voluntarily choose to spend differently out of different income sources so that a one-unit increase in current wages is not treated in the same way as the same increase in current remittance income.

$$\frac{\partial C}{\partial Y_1} \neq \frac{\partial C}{\partial Y_2} \neq \ldots \neq \frac{\partial C}{\partial Y_J} \quad \textbf{(6.2)}$$

Based on (6.1) and (6.2), estimation of MPCs are made using Tobit models since some households exhibit zero consumption of some categories of good. Each category of income is entered separately as required by each test:

$$C_i = \beta_0 + \beta_1' Y_{ij} + \beta_2' A_{ik} + \beta_3' X_i + \varepsilon \qquad \textbf{(6.3)}$$

where C_i is the *ith* household's total consumption (excluding durable goods[30]) in per adult equivalent terms; Y_{ij} denotes the household income from the *jth* income source, and A_{ik} denotes the value of fixed and liquid assets owned by the household. Finally X_i represents a vector of control variables including household characteristics such as age of the household head, education level of household head and regional dummies included to capture systematic differences between regions due to preferences or culture and ε is the error term. All error terms are adjusted for potential heteroskedasticity using White (1980).

The model is estimated separately for male and female headed households. This is important in order to minimise the potentially large impact of intra-household bargaining relationships. Since a large proportion of household remittance income is likely to accrue to the female (say, from husbands working away from home), this may give the female greater power over household spending decisions, producing different MPC out of different income sources. Analysing separately male and female headed households minimises the risk of this[31]. In addition, the study analyses only rural households. Rural and urban households differ widely in their consumption preferences, goods available, and their access to credit and other sources of income. Focusing on rural households (which make up around 85 per cent of the Malawian population) makes the study more relevant for this group and minimises the potential for a large degree of unobserved heterogeneity distorting the results.

Total consumption is regressed against each of the income variables entered separately; fixed (illiquid) and liquid assets; a series of dummies for different sources of income and control variables. Mental accounting theory suggests that the MPC out of different

[30] Since durable goods can be seen to provide a service making them income as well as expenditure, and introducing the problem of simultaneity into the model.

[31] McElroy (1990) and Katz (1995) discuss the intra-household bargaining process.

sources of income is not identical even where the income is equally liquid. That is, households choose not to treat income from different sources identically. Results are presented in Table 6.2 in the appendix to this chapter and the evidence for mental accounting is discussed in Section 6.3.1 below.

After presenting evidence for mental accounting models, it is interesting to ask what remittance income is used for. The Life Cycle-Permanent Income Hypothesis model posits that the marginal propensity to consume any given category of good will be equal for each income source and change in wealth. Income from a given source is not allocated to a particular consumption category. By contrast, behavioural mental accounting models suggest that mental accounts are used for specific purposes. Since income from different sources is assigned into different mental accounts, the MPC for good *(g)* out of one source of income will not equal the marginal MPC good *(h)* out of the same source of income. And the MPC for the specific good *(g)* from source *(1)* will not equal the MPC *(g)* out of *(2)*.

$$\frac{\partial C_g}{\partial Y_1} \neq \frac{\partial C_h}{\partial Y_1}, g \neq h \qquad \textbf{(6.4)}$$

$$\frac{\partial C_g}{\partial Y_1} \neq \frac{\partial C_g}{\partial Y_2}, i \neq j \qquad \textbf{(6.5)}$$

The adult equivalent consumption for each of seven categories is regressed against each income source entered separately, income dummies and control variables as in the previous section. In addition, dummy variables controlling for total consumption quartile are included (with the lowest consumption quartile omitted). This is necessary due to potentially different behaviour amongst households with different total income levels. Therefore dummies indicating total consumption quartile are included to capture the fact that those with high incomes are likely to behave differently from those with lower incomes. This is in line with basic Engel curves which suggest that the proportion of income spent on necessities is lower for richer households than for poorer ones.

The model specification is determined by the hypothesis that households use income from different sources in different ways. Thus, the specification is given by:

C_g = **f(Salary Income; Farming Income; Remittance Income; Asset Value; Control Variables)** **(6.6)**

That is, consumption of good g is a function of the different equally liquid incomes, assets (split by fixed and liquid assets in order to test whether these might be used in different ways, as suggested by Shefrin and Thaler (1988) and shown empirically by Levin (1998)), and control variables.

The control variables fall into three categories: (1) those which are traditionally used in any household or individual study and which would be difficult to justify excluding; (2) those which are specific to this study given the nature of the data; and (3) those which are specific to the cultural context. The first category includes the age and its square of the household head, the head's marital status, sex and education level. The second group includes the household size and number of children, since there may be economies of scale for certain consumption groups. In addition, it includes consumption quartiles in order to control for systematic differences in consumption habits between different wealth groups. Income source dummies are also included in order to ensure that the coefficients on the values of these sources are not biased by constraining each income to the same constant. In addition, this helps to identify any differences in behaviour depending upon whether or not a household receives income from a particular source. Variables that fit into the third category include the number of acres of land owned and whether or not the head works in agriculture. In Malawi, agriculture is of particular importance (as discussed in Chapter 1), and the number of acres owned and employment in this industry compared with others might have large differences in household behaviour making it an important control variable. Other variables that fall into this group are hungry season, and the regional controls, since behaviour can be effected by the season and the region.

Descriptive statistics for the variables are given below:

Table 6.1: Summary statistics for variables used included in models

	Male Headed Household					Female Headed Households				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Food	4037	916.88	1040.28	0	17043.05	1435	877.74	982.86	0	10696.58
Education	4037	27.23	198.62	0	6150.00	1435	26.23	265.90	0	6150.00
Health	4037	39.83	115.29	0	2440.00	1435	34.43	83.36	0	1382.40
Household	4037	1654.12	2144.93	10.95	36966.28	1435	1570.61	1720.98	0	16559.68
Farm	4037	121.62	256.18	0	4770.00	1435	145.19	453.63	0	9721.32
Clothing	4037	308.30	682.62	0	21924.00	1435	310.93	586.75	0	8954.80
Fuel	4037	112.95	640.04	0	25760.00	1435	96.80	354.13	0	10546.20
Salary	4037	618.58	2005.67	0	52864.08	1435	569.41	1851.19	0	16511.45
Remittances	4037	294.27	1985.82	0	69600.00	1435	355.29	1632.40	0	22344.00
Farm	4037	187.71	537.36	0	15395.47	1435	209.01	616.36	0	8850.00
Fixed assets	4037	1968.16	4973.48	0	103455.00	1435	2070.88	5462.09	0	125000.00
Liquid assets	4037	895.52	3694.98	0	113830.90	1435	926.43	3778.58	0	113522.70
Loan	4037	0.20		0	1	1435	0.19		0	1
Business	4037	0.22		0	1	1435	0.22		0	1
Farm	4037	0.46		0	1	1435	0.46		0	1
Salary	4037	0.20		0	1	1435	0.18		0	1
Remittances	4037	0.22		0	1	1435	0.22		0	1
Acres owned	4037	1.84	1.79	0	32	1435	1.88	1.79	0	23.20
Consumption quartile 1	4037	0.19		0	1	1435	0.20		0	1
Consumption quartile 2	4037	0.33		0	1	1435	0.34		0	1
Consumption quartile 3	4037	0.32		0	1	1435	0.30		0	1
Consumption quartile 4	4037	0.16		0	1	1435	0.16		0	1
Age	4037	40.08	14.91	16	114	1435	44.49	16.70	14	99
Works in agriculture	4037	0.43		0	1	1435	0.50		0	1
Married	4037	0.90		0	1	1435	0.28		0	1
Number of children	4037	2.00	1.77	0	12	1435	1.91	1.63	0	9
Household size	4037	4.45	2.35	1	18	1435	3.79	2.20	1	16
Education	4037	2.23	1.55	0	6	1435	2.03		0	6
Hungry season	4037	0.25		0	1	1435	0.26		0	1
Northern dummy	4037	0.14		0	1	1435	0.17		0	1
Southern dummy	4037	0.45		0	1	1435	0.41		0	1
Central dummy	4037	0.42		0	1	1435	0.43		0	1

For each of the categories of consumption analysed, some households reported zero consumption levels. These observations are treated as censored at zero making the Tobit model appropriate[32]. As in the previous OLS estimates, error terms are adjusted for potential heteroskedasticity.

Finally, after presenting results showing how remittance receipts are used, the question is posed as to whether or not remittances can serve to alter household consumption habits. This is suggested by previous results, and can be further supported by findings that show that remittances can be used as a form of insurance (e.g. Dercon et al., 2005; Harrower and Hoddinott, 2005). Remittances help households to smooth consumption and reduce risk. The receipt of remittances therefore may change household consumption habits. Thus, households which receive remittances will exhibit different MPC to those which do not. An additional, intuitive reason is that households that benefit from remittance income may also benefit from increased knowledge of the outside world, which

[32] McDonald and Moffit (1980) and Wooldridge (2002: pp.525-529) give discussions of Tobit models relevant for consumption functions.

contributes to their understanding, for example, of the benefits of investment in health, education or nutrition. This might be termed “network learning effects”.

In order to focus on these differences the samples are split into households which do and which do not receive remittances. Tobit models are used to regress each consumption category against the total per adult equivalent non-business income (excluding remittances), and all other variables. Where differences in consumption patterns can be observed between the two groups, there is some indication that the receipt of remittances alters household behaviour.

Results showing total MPC out of different sources of income, the uses of different sources of income and the differences between remittance receiving and non receiving households are discussed in the following section.

6.3 RESULTS AND ANALYSIS

6.3.1 Evidence for mental accounting

This section discusses the results shown in Table 6.2 of the appendix to this chapter, and presents evidence in favour of mental accounting.

The OLS coefficients on each income source represent marginal propensities to consume. Male headed households (MHH) exhibit a MPC out of salary income of 0.421, a MPC out of farm income of 0.492 and a MPC out of remittance income of 0.065. Female headed households (FHH) have a MPC out of salary income of 0.667, a MPC out of farm income of 0.836 and a MPC out of remittance income of 0.223. All coefficients on liquid income are positive and statistically significant, and two salient points emerge. Firstly, MPCs are consistently larger for FHH than for MHH. This is unlikely to be due to lower income levels amongst FHH than their MHH counterparts. Average consumption is MK2081 for MHH and MK2013 for FHH.

Secondly, formal tests strongly reject the null hypotheses that MPCs for remittance income and salary income are equal, and that MPCs for remittance income and farm income are equal, for both MHH and FHH. The null hypothesis that coefficients on salary income and farm income are equal cannot be rejected for either set of households.

Despite this, there are strong initial indications that remittance income is used differently from income from other sources.

These results are in line with other studies on developing countries. For example, Adams (2005) finds marginal propensities to consume of between 0.54 and 0.59 for Guatemala. The same author finds MPC out of total income of 0.149 for rural Pakistan (Adams, 2002).

Both MHH and FHH exhibit a small but positive and statistically significant MPC out of fixed assets (0.070 and 0.071 respectively) whilst only MHH have a positive and significant MPC (of 0.109) out of liquid assets. The loan dummy is positive, as one would expect; all other things being equal, accessing credit increases consumption. The business income dummy is positive and significant for both sets of household, but is around double the size for MHH compared with FHH. This is indicative of the fact that males who run businesses tend to run larger businesses than their female counterparts. Farming income reduces overall consumption for both MHH and FHH. This is potentially due to the fact that those with farming income have less need to purchase food produced outside of the household, reducing total reported consumption, but is also indicative of the fact stated in Chapter 1 that agriculture employs around 90 per cent of people but produces only around one third of GDP.

The dummy indicating that the household lives in the north of the country is positive and significant for MHH, but not FHH. MHH in the north consume more per adult equivalent than their central and southern counterparts. Finally, consumption is highest during the hungry season. This is unsurprising as, during this period food prices tend to rise as stocks fall, requiring greater expenditure.

6.3.2 How are remittances used?

As before all models are estimated separately for male and female headed households, with results being strongly supportive of the mental accounting hypothesis. Tobit results are presented in Table 6.3 and Table 6.4 in the appendix to this chapter and Table 6.8 presents MPC out of each source of income, as explained in Chapter 4. Signs and significances for MPCs and Tobit coefficients match. Since the aim is to understand how remittances are used, rather than the exact MPC, the discussion which follows focuses on the Tobit results, but draws on MPCs where relevant. It should be noted that the MPCs

are consistently lower than the Tobit coefficients since MPCs are given by the Tobit coefficients weighted by the estimated probability of observed consumption being positive. Where most households exhibit positive consumption for a category, the difference between the Tobit coefficients and the MPC is minimal.

Male headed households exhibit positive and significant MPC out of salary income for food and general household items.

For MHH, the only positive and significant MPC out of remittances is for education. This is evidence that remittance income goes, at least in part, into a "pot" to fund education. In addition, there is a positive relationship between the dummy indicating remittance receipt and education consumption. Other things being equal MHH which receive remittances also spend more on education. Receiving remittances has no discernable impact on any other consumption category.

There is a small but statistically significant negative relationship between remittances and food consumption. It could be that remittances are, in part, motivated by altruism and insurance. Households that are unable to afford sufficient food receive gifts and remittances. The negative coefficient reflects the fact that remittances do not fully cover the lost income, forcing receiving households to reduce their food consumption as part of a coping strategy. Chapter 7 discusses in more detail remittances as an insurance mechanism.

There is a large negative (-0.117) MPC food out of farming income. This should not be a surprise; households with farming income are also likely to consume home grown food, reducing reported spending on food. These results are supported by the negative relationship between acres owned and food expenditure, and the positive relationship between acres owned and farm expenditure. In addition, farming income is used to fund farm expenditure (MPC=0.040) and clothing (MPC=0.052).

Fixed assets are used to fund education and farming, and liquid assets fund education and household items.

The loan dummy is positive and significant for education, health and farm consumption, with the value on education being around four times as great as the next highest coefficient. Those that accessed credit spent nearly MK200 more on education than those who did not, other things being equal. Loans are important in the funding of education, health and farm consumption. It is possible that emergency health expenditure is funded through short term loans, whilst loans and repayment to fund farm expenditure will follow the agricultural cycle.

Business income is generally associated with increased consumption, and having salary income is either positive or insignificant for all consumption categories except food. This could be a reflection of the fact that, in rural Malawi, even stable, regular salaried work can be partly paid in kind with food.

Acres owned is positively associated with health, farm and clothing consumption, with those owning more land being able to afford more of these products. Land ownership and food consumption are negatively associated. As previously discussed, this is likely to be due to the fact that households which own more land are able to produce more of their own food, minimising the need to purchase it. The insignificant coefficient with respect to education is perhaps surprising. Land rich households may be more able to afford to educate their children, but appear to prefer to increase their consumption of health and clothing instead. It is possible that these households tend to make use of their children more as farm labour, or that the (older) children themselves see less value in education, as they have a stable future working on the family farm.

The more children a household has, the less they spend on education in per adult equivalent terms. This result could be explained by the fact that a household has limited resources to spend on education, which increase proportionally less with each additional child. Households would therefore choose which children to educate. Often, the household would pay for the education of the older children, and, once these are educated it becomes their responsibility to fund the education of their younger siblings – often in the form of remittances.

There is a positive association between the hungry season, and amount spent on food for reasons previously stated. In addition, there is a potentially surprising positive

relationship between the hungry season and education. Although rural schools can be lenient when parents are unable to pay school fees on time, a part of these fees tend to be due during the months of the hungry season, explaining this link.

Finally, it is interesting to note that the constant, representing autonomous consumption, is positive and significant for food, but either negative or insignificant for every other category of consumption, suggesting that food is the major necessity in the rural Malawian economy.

Turning to FHH in Table 6.4, the results show that salary income is used to fund household items (MPC=0.174). In addition, a small part of remittance income is used to fund fuel consumption (MPC=0.014). As with MHH, remittances are used to fund education with a positive and significant MPC.

Although both MHH and FHH use remittances to fund education, both the Tobit coefficients presented in Tables 6.2 and 6.3 and the marginal effects reported in Table 6.8 show that this coefficient is significantly larger for FHH than for MHH. Using the same data set but looking intra-household bargaining in only urban Malawi, Davies (forthcoming) notes that education expenditure is positively correlated with greater female "bargaining power" within the household. Female education, female income share and female household headship are all positively correlated with household education expenditure in urban Malawi. This result is however, in contrast to Maitra and Ray (2003) who find that South African males tend to favour education expenditure more, and Duflo and Udry (2003) who find that education expenditure is decreasing in female income in the Ivory Coast.

At the margin, increased remittances income is actually negatively associated with farming spending. This potentially captures some degree of moral hazard whereby increased remittances decrease the need to work on the family farm. Although it is not possible to investigate this hypothesis further, several authors have found that remittances can have a negative impact on labour market participation (Lucas, 1987; Azam and Gubert, 2004).

An increased value of fixed assets is associated with a small increase in food consumption and consumption of household items.

Like their male counterparts, FHH access credit to fund education and farm expenditure, and acres owned is negatively associated with food expenditure but positively associated with farm expenditure.

For both male and female headed households, the hungry season dummy is positive and significant for food, reflecting increased expenditure during this period following price rises.

For both groups of household, consumption quartiles dummies are designed to remove the impact of total wealth from the MPCs due to both differing preferences, and economic behaviour summarised by Engel's law. They indicate that for *all* categories of good, the lowest quartile consumes the least in per adult equivalent terms rising to the highest quartile which consumes the most.

Northern males spend more on education than their central and southern counterparts. This could be interpreted from a historical or cultural perspective; the first schools in Malawi were set up in the north of the country by missionaries, and the "learning culture" still exists today (McCracken, 2002). However, the same is not true for FHH for which those in the south consume more education than those in the centre and south.

6.3.3 Are remittances behaviour changing?

Table 6.5 and Table 6.6 contrast MPC out of total income for remittance receiving and non receiving male headed households, and Table 6.7 and Table 6.8 do the same for female headed households. The aim is to understand whether remittance receiving households differ from their non receiving counterparts in their consumption habits. Although, in the context of cross-sectional data, it may be heroic to suggest that it is only remittances which are driving any differences, it is useful to ask whether there are any differences between receivers and non receivers as the previous results suggest that there may be. Since previous results show that remittances are important to finance education, and that loans also play a role in this, the discussion in this section focuses on

the differences between remittance receivers and non receivers with respect to total income, loans and education.

Amongst MHH, remittance receivers exhibit positive and significant MPC out of total income for clothing and education, whilst non receivers exhibit positive and significant MPC food and household items. It is difficult to assume that remittance receipts are alone responsible for these difference.

Other key differences can be found with respect to loans. For non receivers, these increase consumption of education, health and farming, but for receivers, loans are significant only for education.

It is interesting to note that with respect to total income, and loans, the results are similar for education. Previous results showed that credit is important in funding education, and this appears to be the case for both remittance receivers and non receivers. The two groups do not differ substantially however in the MPC education out of total income.

This result does not hold for FHH however. Although both receivers and non receivers exhibit positive and significant MPC education out of total income, remittance receivers have a MPC education of around seven times that of their non receiving counterparts. This is tentative evidence that remittances increase education expenditure and is in line with results by previous authors, notably Cox Edwards and Ureta (2003).

For remittance receiving FHH, borrowing money is important for funding farming, but not education, whilst for non-receiving households, credit is important in order to fund education (as well as farming). This may suggest some degree of substitutability between remittances and credit for FHH. Those which receive remittances are able to fund education, but those which do not are forced to borrow. Indeed, Udry (1990) suggests that the distinction between credit and remittances might not always be clear.

Overall there is some evidence that receiving and non receiving households differ in their behaviour, however, this evidence should be taken as indicative only, as other, unobserved factors may explain the results. The discussion has focused on education, remittances and credit in order to show that these remain to be key interlinked variables.

6.4 CONCLUSIONS

The results offer support for the use of mental accounting models in Malawi. Households do not, in general, lump all income together, but choose to allocate income differently. This is the case even after analysing male and female headed households separately to minimise the influence of intra-household bargaining. There are some differences between male and female headed households, however, they concur in one notable respect: both choose to allocate remittances towards education.

This chapter has extended the theoretical work of Shefrin and Thaler (1988) and Levin (1998) in order to show that households in a developing country choose to consume differently out of equally liquid forms of income. The findings support the implicit assumption in many studies of remittances that households regard this flow of income as distinct from others and thus choose to use it differently. Furthermore it offers evidence that the reason for this lies, at least in part, in mental accounting. The results are consistent with Adams (2002) who finds that households are more likely to save out of remittance income than other sources, but offers an alternative explanation. In addition to simply analysing the consumption/savings trade-off, this work extends Adams (2002) work by looking at how remittances are spent and how their receipt may alter behaviour.

Remitters may require receiving households to use this income in order to fund education, increasing the total share of education in total household consumption. Furthermore, low MPC out of remittances indicate that these are more likely to be saved than some other forms of income.

This chapter has used cross-sectional data in order to study household behaviour. In order to control for unobserved (but constant) characteristics driving results, ideally longitudinal data would be used. Chapter 7 uses Malawian panel data to study the impact of shocks on consumption and the moderating impact of remittances. However, the data used in this chapter contain more detailed information on income and consumption. In addition, efforts have been made to control for the main likely sources of unobserved heterogeneity (income levels and control of consumption choices by different household members through intra-household bargaining) by analysing only rural households, by controlling for total consumption quartiles where necessary, and by studying male and female headed households separately.

Policy formulation by governments, NGOs and credit or savings institutions need to take account of mental accounting models since these influence consumption and savings habits. Although micro in nature, the existence of mental accounting has important implications at the macro level. If households consume income from different sources differently, this has implications for transfer payments under welfare policies. For example, earned income may not be viewed or spent in the same way as unemployment benefit which may not be spent in the same way as child benefit. Encouraging consumption of certain types of good deemed "useful" might be achieved through policies designed to alter the composition of household income.

Remittances should be encouraged in Malawi since they encourage savings and consumption of education. Current efforts to help reduce the costs of remittances are a step in the right direction.

Banks are more likely to be successful in attracting household funds if they encourage the saving of particular forms of income, notably remittances. On the lending side, micro-finance organisations must not only improve access to credit, but must ensure that mental accounting models encourage the "constructive" use of credit (which is shown to have an important role in funding education and farming for both male and female headed households); targeted publicity may help to support this aim. Lending institutions requiring valuable collateral may be unsuccessful as low marginal propensities to consume out of these indicate mental accounting systems do not currently appear to permit households to consume out of these assets.

APPENDIX

Table 6.2: Robust OLS models. Dependent Variable: Total Consumption PAE

	Male Headed	Female Headed
Salary	0.421***	0.667***
	(4.048)	(6.593)
Remittances	0.065***	0.223***
	(3.260)	(4.208)
Farm	0.492**	0.836**
	(2.386)	(2.339)
Fixed assets	0.070***	0.071***
	(3.778)	(6.946)
Liquid assets	0.109***	0.042
	(2.912)	(1.303)
Loan dummy	254.663***	569.696***
	(2.778)	(4.040)
Business dummy	1016.794***	465.307***
	(7.524)	(3.552)
Farm dummy	-422.607***	-319.428*
	(-3.912)	(-1.804)
Salary work dummy	391.338	-463.980*
	(1.352)	(-1.809)
Remittance dummy	-30.009	34.280
	(-0.382)	(0.225)
Acres owned	51.983	29.649
	(1.228)	(0.747)
Age	4.783	-5.182
	(0.401)	(-0.358)
Age square	-0.069	-0.005
	(-0.587)	(-0.040)
Agriculture dummy	-69.385	-80.803
	(-0.852)	(-0.834)
Married dummy	-112.494	-37.409
	(-0.823)	(-0.324)
Number children	-30.478	-42.736
	(-0.728)	(-0.806)
Household size	46.477	1.160
	(1.456)	(0.030)
Education	14.628	24.951
	(0.701)	(0.705)
Hungry season	221.016***	223.303**
	(2.720)	(2.033)
North dummy[†]	785.452***	149.824
	(3.786)	(0.903)
South dummy[†]	-88.650	-93.969
	(-0.830)	(-0.668)
Constant	994.360***	1422.472***
	(3.526)	(3.732)
N	4037	1435
r2	0.224	0.347
F	21.589	12.345
Coefficient Equality Test (t-values)		
Null Hypothesis		
Salary=Remittances	11.08*** (R[‡])	15.48*** (R[‡])
Salary=Farm	0.09 (NR[‡])	0.20 (NR[‡])
Remittances=Farm	4.15** (R[‡])	2.80* (R[‡])

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms.* [†] *Omitted variable: Central (capital) region.* [‡] *(R) indicates rejection of the null hypothesis, (NR) indicates non-rejection of the null hypothesis.*

Table 6.3: Consumption of different categories of good from different income sources – Male heads

	Tobit models - Male Headed Households						
	Food	**Education**	**Health**	**Household**	**Farm**	**Clothing**	**Fuel**
Salary	0.053***	0.017	0.006	0.104***	-0.002	0.021	-0.002
	(3.398)	(1.222)	(0.902)	(2.973)	(-0.380)	(1.491)	(-0.351)
Remittances	-0.014*	0.026***	-0.001	-0.005	-0.008	0.009	0.001
	(-1.896)	(3.154)	(-0.721)	(-0.493)	(-1.522)	(1.115)	(0.297)
Farm	-0.130***	0.021	-0.003	-0.049	0.086***	0.092**	0.053
	(-3.949)	(0.456)	(-0.664)	(-0.393)	(4.840)	(1.986)	(0.755)
Fixed assets	0.007	0.005*	0.000	0.018	0.002*	0.003	0.007
	(0.715)	(1.784)	(0.094)	(1.349)	(1.673)	(0.910)	(1.347)
Liquid assets	0.009	0.012***	0.000	0.044*	0.001	-0.004	0.010
	(0.836)	(3.083)	(0.309)	(1.718)	(0.360)	(-0.810)	(1.278)
Loan dummy	22.792	195.685***	13.962**	-8.416	42.360***	41.212	-23.829
	(0.690)	(3.964)	(2.074)	(-0.157)	(3.045)	(1.356)	(-1.452)
Business dummy	92.019***	55.905	4.126	233.923***	-19.876	88.894***	124.959***
	(3.139)	(1.204)	(0.646)	(3.392)	(-1.435)	(3.446)	(2.937)
Farm dummy	-50.343**	83.672*	-4.971	-138.426**	101.830***	3.798	-28.108
	(-2.102)	(1.804)	(-0.969)	(-2.405)	(7.583)	(0.142)	(-1.062)
Salary work dummy	-99.647**	221.565***	0.480	-99.860	9.006	88.253**	-5.697
	(-2.559)	(3.852)	(0.027)	(-1.093)	(0.477)	(2.284)	(-0.300)
Remittance dummy	-25.015	114.769**	7.678	-17.516	-4.947	16.706	-5.926
	(-0.988)	(2.238)	(1.539)	(-0.380)	(-0.348)	(0.676)	(-0.360)
Acres owned	-43.628***	12.076	8.103***	-7.548	70.666***	38.529***	7.900
	(-4.506)	(1.037)	(3.481)	(-0.266)	(9.339)	(2.968)	(0.464)
Second lowest consumption quartile[†]	330.915***	122.038*	40.498***	445.706***	128.723***	201.299***	52.498***
	(28.369)	(1.836)	(6.737)	(23.416)	(8.765)	(6.559)	(3.992)
Second highest consumption quartile[†]	900.394***	204.261***	74.841***	1321.030***	236.464***	464.103***	67.860***
	(42.772)	(2.951)	(9.992)	(39.493)	(14.064)	(11.269)	(4.195)
Top consumption quartile[†]	2215.775***	534.954***	151.265***	4412.446***	375.148***	1186.045***	404.775***
	(32.497)	(4.926)	(8.590)	(31.658)	(12.292)	(14.385)	(5.610)
Age	-1.454	-7.524	1.104	2.018	1.766	1.646	4.467
	(-0.339)	(-0.971)	(1.269)	(0.291)	(0.897)	(0.389)	(1.420)
Age square	0.017	0.051	-0.012	-0.019	-0.018	-0.016	-0.044
	(0.393)	(0.650)	(-1.367)	(-0.290)	(-0.906)	(-0.400)	(-1.475)

Agriculture dummy	3.177	-41.767	-0.264	4.050	9.403	-14.735	24.859
	(0.134)	(-0.930)	(-0.051)	(0.089)	(0.814)	(-0.555)	(1.182)
Married dummy	-62.663	81.580	-1.528	-20.152	-3.419	23.931	11.607
	(-1.219)	(1.144)	(-0.178)	(-0.279)	(-0.179)	(0.570)	(0.471)
Number children	-15.921	-53.010*	-1.862	16.458	8.580	15.194	9.215
	(-1.180)	(-1.783)	(-0.551)	(0.747)	(1.206)	(0.842)	(1.083)
Household size	12.147	26.053	1.259	-5.166	-7.680	-7.274	-8.390
	(1.022)	(1.242)	(0.516)	(-0.296)	(-1.469)	(-0.509)	(-1.240)
Education	-0.167	1.420	1.365	6.044	-2.601	-2.748	-1.247
	(-0.025)	(0.111)	(0.887)	(0.503)	(-0.636)	(-0.381)	(-0.262)
Hungry season	50.672**	160.059***	-6.520	-53.216	3.080	-61.376**	-26.196
	(1.976)	(3.126)	(-1.171)	(-1.057)	(0.227)	(-2.039)	(-1.587)
North dummy[†]	-63.777	304.951***	-15.155**	269.631**	-126.532***	243.054***	79.784
	(-1.429)	(3.736)	(-2.113)	(2.576)	(-5.524)	(3.993)	(1.516)
South dummy[†]	125.087***	118.428**	-49.910***	126.600*	-97.564***	-61.353**	-16.498
	(4.084)	(2.406)	(-6.206)	(1.837)	(-6.208)	(-2.006)	(-0.537)
Constant	250.454***	-1494.762***	-95.465***	185.944	-358.069***	-471.829***	-209.962**
	(2.932)	(-5.747)	(-3.892)	(1.182)	(-6.169)	(-3.309)	(-2.164)
Standard error of regression	711.728***	741.749***	147.432***	1429.069***	308.078***	717.917***	667.810***
	(16.294)	(7.208)	(12.250)	(10.583)	(16.905)	(6.310)	(4.136)
N	4037	4037	4037	4037	4037	4037	4037
McFadden r2	0.046	0.039	0.018	0.045	0.046	0.028	0.005
Log Likelihood	-32100	-3870	-16600	-35100	-16500	-23300	-28100
F	217.133	2.941	8.926	384.670	20.812	19.313	9.425
Censored	18	3640	1606	0	1863	1222	532

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms..* [†] *Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.4: Consumption of different categories of good from different income sources – Female heads

	Tobit models - Female Headed Households						
	Food	**Education**	**Health**	**Household**	**Farm**	**Clothing**	**Fuel**
Salary	0.058	0.022	0.002	0.183***	0.050	0.015	0.015*
	(1.372)	(0.959)	(0.700)	(3.063)	(1.223)	(0.879)	(1.662)
Remittances	0.026	0.123**	-0.001	0.042	-0.023*	0.001	0.025**
	(0.950)	(2.104)	(-0.133)	(1.025)	(-1.882)	(0.032)	(2.264)
Farm	-0.083**	-0.266	0.002	-0.023	0.234**	0.062	0.020
	(-2.083)	(-1.517)	(0.454)	(-0.343)	(2.077)	(1.194)	(0.943)
Fixed assets	0.028***	-0.009	0.001	0.023***	0.003	-0.004	-0.002
	(3.473)	(-0.853)	(0.654)	(3.696)	(0.499)	(-0.899)	(-1.139)
Liquid assets	-0.002	0.015	0.000	0.009	0.001	0.006	0.008
	(-0.641)	(1.455)	(0.445)	(0.674)	(0.199)	(1.157)	(0.823)
Loan dummy	-45.383	289.182**	13.828	-24.010	114.365**	53.134	-5.486
	(-1.014)	(2.514)	(1.452)	(-0.335)	(2.538)	(1.076)	(-0.233)
Business dummy	69.447	-71.563	4.081	63.842	-89.823***	25.885	29.162
	(1.625)	(-0.632)	(0.535)	(1.049)	(-2.767)	(0.688)	(1.462)
Farm dummy	-59.105*	156.679	14.889*	-46.307	76.088	-20.596	22.227
	(-1.723)	(1.511)	(1.889)	(-0.826)	(1.603)	(-0.506)	(0.772)
Salary work dummy	-111.694	-50.669	20.113*	-207.965	-159.759	58.797	-12.690
	(-1.081)	(-0.346)	(1.672)	(-1.475)	(-1.580)	(1.030)	(-0.568)
Remittance dummy	19.613	133.487	6.623	56.435	93.026*	9.592	-56.595***
	(0.470)	(1.049)	(0.778)	(0.713)	(1.658)	(0.162)	(-2.594)
Acres owned	-40.848***	-6.076	0.650	-17.026	95.492***	22.385**	-8.049
	(-3.749)	(-0.207)	(0.353)	(-0.856)	(5.100)	(2.088)	(-1.601)
Second lowest consumption quartile[†]	334.235***	209.354	30.685***	479.442***	182.199***	258.835***	55.066***
	(18.672)	(1.447)	(4.207)	(23.160)	(4.543)	(6.670)	(2.898)
Second highest consumption quartile[†]	880.422***	353.509**	66.228***	1416.485***	299.085***	534.209***	90.517***
	(26.456)	(2.264)	(7.012)	(36.534)	(6.817)	(10.620)	(4.099)
Top consumption quartile[†]	2019.025***	800.800***	97.143***	3861.744***	482.822***	1178.275***	293.733***
	(20.352)	(3.418)	(6.632)	(23.358)	(5.937)	(11.037)	(3.274)
Age	-3.545	-3.739	0.671	-6.387	-4.248	-2.874	1.112
	(-0.757)	(-0.256)	(0.752)	(-0.753)	(-0.921)	(-0.465)	(0.574)
Age square	0.029	0.016	-0.006	0.053	0.023	0.030	-0.008
	(0.618)	(0.114)	(-0.689)	(0.655)	(0.478)	(0.495)	(-0.476)

Agriculture dummy	-17.487	91.656	7.879	15.855	15.835	-30.048	30.748
	(-0.528)	(0.987)	(1.210)	(0.324)	(0.535)	(-0.886)	(1.521)
Married dummy	-47.229	-83.864	7.446	-27.262	-45.130	22.519	0.104
	(-1.136)	(-0.783)	(1.044)	(-0.469)	(-1.241)	(0.526)	(0.006)
Number children	6.213	-2.281	0.293	-2.672	-12.144	-9.582	0.619
	(0.331)	(-0.042)	(0.084)	(-0.107)	(-0.677)	(-0.528)	(0.087)
Household size	5.902	-19.869	-1.314	2.484	-1.173	3.227	-6.438
	(0.464)	(-0.477)	(-0.490)	(0.134)	(-0.092)	(0.246)	(-0.790)
Education	20.650	30.543	2.360	29.131	-9.759	2.194	2.880
	(1.415)	(1.023)	(0.927)	(1.480)	(-0.927)	(0.218)	(0.728)
Hungry season	121.342***	67.874	-10.013	34.436	54.379	-110.113***	14.656
	(3.191)	(0.714)	(-1.564)	(0.611)	(1.584)	(-2.943)	(0.840)
North dummy[†]	-160.249***	168.014	-22.632**	-1.670	-173.333***	230.196***	-23.507
	(-2.938)	(1.195)	(-2.304)	(-0.023)	(-3.164)	(4.410)	(-1.305)
South dummy[†]	150.433***	241.960**	-45.926***	123.612	-114.849***	-105.290***	-4.920
	(3.413)	(2.170)	(-5.142)	(1.593)	(-2.674)	(-2.778)	(-0.188)
Constant	181.143	-1883.719***	-64.404**	306.497	-370.880***	-255.258**	-68.891
	(1.442)	(-4.313)	(-2.373)	(1.567)	(-3.596)	(-1.965)	(-0.944)
Standard error of regression	655.132***	936.006***	106.272***	951.796***	550.798***	588.969***	362.063***
	(14.096)	(5.369)	(9.363)	(11.246)	(5.451)	(9.616)	(3.133)
N	1435	1435	1435	1435	1435	1435	1435
McFadden r2	0.049	0.043	0.019	0.067	0.033	0.035	0.009
Log Likelihood	-11300	-1249	-5734	-11900	-6511	-8156	-9291
F	74.990	1.185	4.522	169.969	5.564	13.061	5.984
Censored	5	1311	548	1	634	424	182

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms..* [†] *Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.5: Consumption of different categories of good from total income – Male remittance receivers

	Tobit models - Male Headed Households - Remittance Receivers						
	Food	**Education**	**Health**	**Household**	**Farm**	**Clothing**	**Fuel**
Total income	-0.006	0.027***	-0.001	0.014	-0.003	0.022**	0.004
	(-0.829)	(3.250)	(-0.694)	(1.056)	(-0.657)	(2.450)	(1.444)
Fixed assets	-0.002	0.004	-0.002*	-0.012	0.002	-0.001	0.003
	(-0.460)	(0.815)	(-1.963)	(-0.947)	(0.738)	(-0.476)	(0.884)
Liquid assets	0.008	0.016**	-0.001	0.100**	-0.006	0.004	0.042***
	(0.484)	(2.394)	(-0.975)	(2.330)	(-1.237)	(0.514)	(4.230)
Loan dummy	7.679	184.412*	3.487	6.347	48.223	60.793	-8.452
	(0.126)	(1.781)	(0.330)	(0.065)	(1.472)	(1.315)	(-0.400)
Business dummy	99.274	157.436	4.771	97.863	-3.671	40.912	55.059*
	(1.493)	(1.626)	(0.439)	(0.811)	(-0.115)	(0.786)	(1.824)
Farm dummy	-146.408***	170.023*	-14.279*	-244.984***	131.158***	83.823**	-39.452
	(-3.217)	(1.867)	(-1.831)	(-3.067)	(5.000)	(2.105)	(-1.284)
Salary work dummy	57.643	174.162	5.858	272.822*	9.023	59.636	51.155
	(0.773)	(1.599)	(0.523)	(1.660)	(0.268)	(0.887)	(1.526)
Acres owned	-63.839***	-17.141	5.978***	-46.324	61.075***	17.629	23.160
	(-3.274)	(-1.016)	(2.801)	(-1.045)	(5.630)	(0.870)	(0.805)
Second lowest consumption quartile †	335.322***	-95.016	13.972*	491.154***	113.807***	200.427***	13.141
	(12.347)	(-0.748)	(1.772)	(13.128)	(4.117)	(4.950)	(0.777)
Second highest consumption quartile †	850.884***	39.526	39.465***	1314.589***	221.065***	415.424***	24.735
	(21.134)	(0.336)	(4.076)	(23.956)	(6.992)	(8.730)	(1.081)
Top consumption quartile †	2062.493***	294.903	124.382***	4244.048***	375.810***	1083.625***	244.412***
	(15.398)	(1.534)	(5.448)	(16.606)	(5.743)	(9.885)	(5.078)
Age	11.045	-30.385	2.731**	13.525	-0.781	-4.436	2.750
	(1.442)	(-1.556)	(2.021)	(1.106)	(-0.198)	(-0.669)	(0.775)
Age square	-0.095	0.323*	-0.026**	-0.115	0.003	0.041	-0.031
	(-1.267)	(1.697)	(-2.014)	(-0.965)	(0.080)	(0.636)	(-0.866)
Agriculture dummy	69.199	-197.214*	-0.856	115.493	1.618	33.557	-4.670
	(1.582)	(-1.746)	(-0.112)	(1.453)	(0.067)	(0.865)	(-0.236)
Married dummy	-66.742	194.156	0.812	7.226	-48.063	25.606	6.462
	(-0.713)	(1.289)	(0.061)	(0.048)	(-1.106)	(0.377)	(0.177)
Number children	3.248	-47.484	-0.604	64.119	24.118	10.917	-4.124
	(0.115)	(-0.850)	(-0.132)	(1.193)	(1.279)	(0.418)	(-0.307)

Household size	-4.504	13.102	-1.813	-43.908	-6.424	-2.303	-0.478
	(-0.187)	(0.317)	(-0.504)	(-1.153)	(-0.531)	(-0.114)	(-0.037)
Education	4.658	-10.212	-6.270***	2.552	-13.238*	-9.293	4.554
	(0.326)	(-0.344)	(-2.600)	(0.103)	(-1.658)	(-0.629)	(0.908)
Hungry season	-12.517	142.080	-6.876	35.281	-27.150	38.891	-12.822
	(-0.279)	(1.455)	(-0.933)	(0.381)	(-1.015)	(0.917)	(-0.688)
North dummy †	-193.185***	285.599	-11.163	-3.928	-93.094*	112.418	37.375
	(-2.896)	(1.581)	(-1.011)	(-0.023)	(-1.941)	(1.383)	(0.872)
South dummy †	100.999*	-9.438	-45.873***	25.712	-134.996***	-64.383	30.883
	(1.749)	(-0.099)	(-4.171)	(0.245)	(-4.441)	(-1.270)	(0.685)
Constant	86.878	-820.762**	-46.874	58.765	-214.045**	-263.861	-143.049
	(0.512)	(-2.279)	(-1.481)	(0.207)	(-2.056)	(-1.636)	(-1.536)
Standard error of regression	628.754***	808.610***	105.260***	1136.323***	302.809***	535.316***	270.018***
	(15.507)	(3.392)	(9.096)	(9.357)	(9.959)	(13.717)	(7.258)
N	890	890	890	890	890	890	890
McFadden r2	0.047	0.035	0.020	0.058	0.042	0.037	0.039
Log Likelihood	-6990.654	-1078.128	-3756.977	-7524.497	-3827.907	-5173.510	-5538.211
F	48.544	1.148	3.441	74.535	6.462	10.426	4.920
Censored	1	778	304	0	381	240	112

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms.. † Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.6: Consumption of different categories of good from total income – Male non remittance receivers

	Tobit models - Male Headed Households - Non Remittance Receivers						
	Food	**Education**	**Health**	**Household**	**Farm**	**Clothing**	**Fuel**
Total income	0.025**	0.021*	0.006	0.051**	0.003	0.010	-0.000
	(2.170)	(1.796)	(1.290)	(2.204)	(0.563)	(1.032)	(-0.022)
Fixed assets	0.008	0.005	0.000	0.026*	0.002	0.004	0.009
	(0.731)	(1.463)	(0.375)	(1.649)	(1.193)	(0.887)	(1.427)
Liquid assets	0.003	0.012**	0.000	0.023	0.007**	-0.002	0.002
	(0.241)	(2.420)	(0.411)	(1.036)	(2.568)	(-0.383)	(0.426)
Loan dummy	36.921	187.085***	16.663**	3.450	30.961**	30.202	-31.613
	(0.922)	(3.523)	(2.052)	(0.053)	(2.053)	(0.822)	(-1.371)
Business dummy	94.823***	41.192	4.556	266.636***	-30.439*	96.518***	137.911***
	(2.833)	(0.783)	(0.606)	(3.338)	(-1.947)	(3.265)	(2.846)
Farm dummy	-97.046***	51.299	-5.019	-152.051***	134.891***	17.017	2.928
	(-3.483)	(1.056)	(-0.864)	(-2.766)	(8.262)	(0.617)	(0.107)
Salary work dummy	-1.938	206.992***	5.418	24.861	-6.511	120.110***	-48.615*
	(-0.053)	(3.393)	(0.402)	(0.332)	(-0.329)	(2.792)	(-1.684)
Acres owned	-42.274***	26.224*	9.030***	-10.813	81.855***	46.634***	-2.667
	(-3.405)	(1.710)	(3.103)	(-0.309)	(11.151)	(2.949)	(-0.171)
Second lowest consumption quartile †	320.729***	202.681**	48.852***	430.458***	140.669***	203.303***	68.097***
	(23.229)	(2.445)	(6.291)	(19.715)	(7.778)	(5.609)	(4.070)
Second highest consumption quartile †	893.387***	259.552***	86.311***	1309.469***	259.182***	487.024***	85.673***
	(35.255)	(3.081)	(8.891)	(36.039)	(12.210)	(10.064)	(4.781)
Top consumption quartile †	2253.328***	584.673***	158.123***	4492.000***	405.201***	1235.633***	449.482***
	(28.769)	(5.038)	(7.451)	(27.541)	(10.654)	(12.346)	(4.747)
Age	-5.384	6.035	0.384	-1.108	2.674	3.472	5.772
	(-1.061)	(0.588)	(0.364)	(-0.131)	(1.163)	(0.681)	(1.362)
Age square	0.054	-0.113	-0.005	0.008	-0.025	-0.035	-0.057
	(1.070)	(-0.996)	(-0.490)	(0.098)	(-1.116)	(-0.706)	(-1.379)
Agriculture dummy	-17.350	3.398	-0.821	-31.108	12.879	-29.833	31.969
	(-0.621)	(0.069)	(-0.130)	(-0.574)	(0.953)	(-0.900)	(1.237)
Married dummy	-71.663	49.206	-1.210	-42.362	14.587	24.296	15.640
	(-1.173)	(0.624)	(-0.115)	(-0.513)	(0.677)	(0.489)	(0.493)
Number children	-24.362	-59.048	-2.166	3.674	5.935	18.583	12.984
	(-1.558)	(-1.634)	(-0.519)	(0.148)	(0.766)	(0.842)	(1.295)

Household size	18.974	31.903	2.157	5.096	-9.274	-10.164	-11.133
	(1.381)	(1.293)	(0.722)	(0.257)	(-1.558)	(-0.583)	(-1.432)
Education	-0.110	1.115	3.448*	6.962	-0.658	-2.616	-4.531
	(-0.014)	(0.079)	(1.883)	(0.504)	(-0.135)	(-0.319)	(-0.762)
Hungry season	77.180**	169.966***	-6.613	-55.051	6.864	-96.706***	-27.806
	(2.567)	(2.813)	(-0.955)	(-0.953)	(0.426)	(-2.720)	(-1.292)
North dummy †	-71.513	309.082***	-20.898**	302.267**	-128.502***	286.897***	88.942
	(-1.298)	(3.526)	(-2.427)	(2.338)	(-4.980)	(3.900)	(1.281)
South dummy †	125.680***	175.709***	-49.324***	139.100	-70.871***	-54.476	-38.008
	(3.391)	(3.002)	(-5.024)	(1.640)	(-4.373)	(-1.438)	(-1.176)
Constant	319.688***	-1789.863***	-105.374***	247.372	-443.262***	-539.638***	-226.910*
	(3.235)	(-5.026)	(-3.474)	(1.282)	(-6.247)	(-3.168)	(-1.720)
Standard error of regression	737.878***	704.619***	157.807***	1499.088***	313.599***	765.247***	738.902***
	(13.744)	(7.096)	(10.815)	(9.252)	(13.909)	(5.528)	(3.916)
N	3147	3147	3147	3147	3147	3147	3147
McFadden r2	0.045	0.044	0.018	0.042	0.047	0.026	0.004
Log Likelihood	-2.51e+04	-2777.671	-1.27e+04	-2.75e+04	-1.27e+04	-1.81e+04	-2.22e+04
F	197.661	2.792	7.707	347.317	20.203	15.634	7.751
Censored	17	2862	1302	0	1482	982	420

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms.. † Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.7: Consumption of different categories of good from total income – Female remittance receivers

	Tobit models - Female Headed Households - Remittance Receivers						
	Food	**Education**	**Health**	**Household**	**Farm**	**Clothing**	**Fuel**
Total income	-0.007	0.104**	0.002	0.060	0.043	0.042	0.029***
	(-0.429)	(1.980)	(0.607)	(1.468)	(1.210)	(1.195)	(3.031)
Fixed assets	0.037***	-0.258**	0.001	0.018**	-0.001	-0.013*	-0.003*
	(3.188)	(-2.076)	(0.883)	(2.308)	(-0.143)	(-1.843)	(-1.720)
Liquid assets	-0.002	0.002	-0.000	-0.001	0.005	0.004	0.001
	(-0.539)	(0.157)	(-0.517)	(-0.175)	(0.616)	(0.837)	(0.554)
Loan dummy	-79.290	392.337	13.442	87.715	212.814*	71.799	-3.012
	(-0.857)	(1.283)	(0.911)	(0.526)	(1.657)	(0.579)	(-0.163)
Business dummy	-119.283	-88.744	-1.468	20.004	-169.303	125.349	18.259
	(-1.245)	(-0.275)	(-0.077)	(0.123)	(-1.424)	(1.191)	(0.638)
Farm dummy	-196.399**	133.093	17.356	-267.959**	242.278**	42.991	-3.680
	(-2.300)	(0.523)	(1.309)	(-2.017)	(2.155)	(0.375)	(-0.202)
Salary work dummy	273.874*	-692.661	40.222*	395.187	81.132	-202.371	-41.184
	(1.912)	(-1.561)	(1.896)	(1.580)	(0.389)	(-1.242)	(-0.947)
Acres owned	-34.182	-86.909	0.504	71.705	181.234***	92.270***	5.389
	(-1.145)	(-0.860)	(0.109)	(1.205)	(2.621)	(2.946)	(0.690)
Second lowest consumption quartile †	387.234***	-57.582	42.426**	499.745***	284.878**	199.295*	21.235
	(9.292)	(-0.151)	(2.349)	(8.483)	(2.191)	(1.852)	(1.315)
Second highest consumption quartile †	884.193***	345.496	58.804***	1377.092***	363.535***	509.475***	22.928
	(12.057)	(0.886)	(3.173)	(12.267)	(2.843)	(3.466)	(0.982)
Top consumption quartile †	2195.711***	1425.918***	112.867***	4251.365***	597.720**	1038.029***	136.980***
	(10.368)	(2.644)	(3.997)	(9.246)	(2.175)	(2.909)	(2.946)
Age	-3.534	-8.063	0.324	-33.957	-8.028	-17.982	-2.788
	(-0.339)	(-0.216)	(0.198)	(-1.249)	(-0.612)	(-1.082)	(-1.175)
Age square	0.037	0.037	0.003	0.280	0.065	0.152	0.034
	(0.348)	(0.096)	(0.152)	(1.124)	(0.451)	(0.973)	(1.272)
Agriculture dummy	17.927	-205.938	29.727**	106.118	114.609	58.875	-3.314
	(0.214)	(-0.679)	(2.025)	(0.684)	(1.218)	(0.642)	(-0.178)
Married dummy	-100.140	253.408	-7.643	-153.438	-95.391	72.133	50.014*
	(-1.025)	(0.851)	(-0.539)	(-0.832)	(-0.670)	(0.621)	(1.820)
Number children	28.989	233.475	6.531	-17.948	12.923	-60.736	-0.522
	(0.625)	(1.572)	(0.862)	(-0.253)	(0.221)	(-1.328)	(-0.059)

Household size	-37.825	-110.864	-4.013	-10.306	-4.563	55.645	-4.822
	(-1.072)	(-0.905)	(-0.628)	(-0.185)	(-0.110)	(1.613)	(-0.723)
Education	10.967	40.184	-0.577	18.229	-18.721	6.692	-0.173
	(0.272)	(0.570)	(-0.102)	(0.304)	(-0.520)	(0.251)	(-0.022)
Hungry season	151.594*	174.567	24.594*	80.907	-117.429	-164.239*	3.333
	(1.880)	(0.613)	(1.714)	(0.558)	(-1.143)	(-1.713)	(0.187)
North dummy †	-89.177	396.015	-30.994	-267.620	-316.313	-63.247	-4.888
	(-0.699)	(1.115)	(-1.467)	(-1.354)	(-1.240)	(-0.470)	(-0.163)
South dummy †	184.360**	124.226	-34.251**	292.230	-117.867	-56.561	14.170
	(2.426)	(0.368)	(-2.131)	(1.556)	(-1.195)	(-0.574)	(0.581)
Constant	327.404	-1878.751*	-91.471*	943.195	-766.924**	-173.458	15.187
	(1.367)	(-1.830)	(-1.888)	(1.552)	(-2.277)	(-0.460)	(0.251)
Standard error of regression	695.055***	1368.035***	105.509***	1149.799***	900.979***	747.033***	156.734***
	(7.240)	(5.105)	(6.808)	(6.954)	(3.485)	(4.096)	(8.154)
N	319	319	319	319	319	319	319
McFadden r2	0.053	0.061	0.024	0.060	0.024	0.026	0.047
Log Likelihood	-2540.175	-429.488	-1344.877	-2700.744	-1663.402	-1922.862	-1849.298
F	22.368	0.814	2.045	34.141	2.033	3.864	3.284
Censored	0	276	109	0	124	87	38

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms.. † Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.8: Consumption of different categories of good from total income – Female non remittance receivers

	Tobit models - Female Headed Households - Non Remittance Receivers						
	Food	Education	Health	Household	Farm	Clothing	Fuel
Total income	0.039*	0.011**	0.000	0.155***	0.002	-0.001	0.077**
	(1.811)	(2.489)	(0.192)	(8.565)	(0.585)	(-0.097)	(2.250)
Fixed assets	0.011*	0.009	-0.001	0.015*	0.007	0.003	-0.001
	(1.752)	(1.402)	(-0.953)	(1.716)	(1.037)	(0.362)	(-0.580)
Liquid assets	-0.016	0.016*	0.001	-0.005	-0.008	0.010	0.007
	(-1.485)	(1.878)	(0.401)	(-0.395)	(-1.290)	(1.358)	(0.785)
Loan dummy	-39.592	132.566**	14.109	-28.715	52.774*	44.208	17.974
	(-0.792)	(2.404)	(1.198)	(-0.418)	(1.717)	(0.983)	(0.659)
Business dummy	100.296**	24.440	3.322	45.678	-100.192***	4.043	27.513
	(2.185)	(0.479)	(0.406)	(0.849)	(-3.015)	(0.114)	(1.091)
Farm dummy	-118.335***	25.729	13.712	-143.919***	146.589***	-9.586	-3.736
	(-2.985)	(0.555)	(1.543)	(-2.950)	(3.684)	(-0.268)	(-0.187)
Salary work dummy	-85.368	30.123	22.524*	-138.136*	-52.275	124.151**	-171.024*
	(-1.061)	(0.488)	(1.937)	(-1.946)	(-1.428)	(2.540)	(-1.746)
Acres owned	-32.283**	-12.367	1.339	-29.981	84.416***	4.998	-7.539
	(-2.388)	(-0.797)	(0.592)	(-1.459)	(5.070)	(0.393)	(-1.269)
Second lowest consumption quartile †	325.465***	117.511	28.084***	475.231***	154.398***	249.567***	48.814***
	(16.226)	(1.620)	(3.410)	(21.501)	(4.435)	(6.942)	(3.414)
Second highest consumption quartile †	894.810***	149.833**	69.489***	1402.100***	295.208***	505.704***	70.319***
	(24.946)	(1.983)	(6.440)	(35.827)	(6.839)	(11.912)	(3.126)
Top consumption quartile †	1984.911***	252.564***	95.253***	3588.994***	531.353***	1174.249***	116.929*
	(19.554)	(2.601)	(5.707)	(28.994)	(5.430)	(13.986)	(1.651)
Age	-6.026	0.660	0.707	0.623	-1.518	4.352	0.845
	(-1.177)	(0.092)	(0.644)	(0.092)	(-0.390)	(0.805)	(0.353)
Age square	0.053	-0.009	-0.008	-0.006	-0.002	-0.032	-0.010
	(1.036)	(-0.132)	(-0.750)	(-0.081)	(-0.046)	(-0.595)	(-0.447)
Agriculture dummy	-41.518	56.120	2.077	-32.967	2.790	-42.939	29.119
	(-1.169)	(1.343)	(0.285)	(-0.737)	(0.105)	(-1.286)	(1.569)
Married dummy	-33.914	-108.790*	10.498	-25.730	-37.119	7.674	-27.010
	(-0.770)	(-1.778)	(1.267)	(-0.482)	(-1.234)	(0.198)	(-1.295)
Number children	-3.459	-33.487	-1.213	-2.709	-7.497	1.401	-1.575
	(-0.171)	(-1.248)	(-0.305)	(-0.115)	(-0.452)	(0.077)	(-0.180)

Household size	19.746	5.632	-0.674	16.286	-2.739	-7.020	0.024
	(1.448)	(0.299)	(-0.227)	(1.015)	(-0.244)	(-0.528)	(0.004)
Education	24.104	13.781	3.137	38.236**	-5.399	1.895	8.394
	(1.604)	(0.961)	(1.096)	(2.154)	(-0.569)	(0.180)	(1.434)
Hungry season	129.625***	18.390	-20.079***	74.064	72.106*	-85.509**	41.814**
	(3.028)	(0.391)	(-2.671)	(1.448)	(1.773)	(-2.114)	(2.470)
North dummy †	-144.659**	55.771	-23.113**	34.086	-147.676***	269.312***	-39.588*
	(-2.393)	(0.807)	(-2.175)	(0.445)	(-3.170)	(4.722)	(-1.718)
South dummy †	127.568**	108.414*	-48.978***	39.367	-36.858	-108.135***	-21.935
	(2.480)	(1.668)	(-4.553)	(0.598)	(-0.955)	(-2.616)	(-0.796)
Constant	231.165	-851.947***	-53.462	167.901	-349.627***	-359.878***	-68.186
	(1.566)	(-3.804)	(-1.640)	(0.935)	(-3.258)	(-2.672)	(-0.935)
Standard error of regression	631.339***	385.076***	105.064***	778.643***	401.492***	516.198***	311.714***
	(11.912)	(5.379)	(7.593)	(11.407)	(6.270)	(16.666)	(6.210)
N	1116	1116	1116	1116	1116	1116	1116
McFadden r2	0.050	0.038	0.020	0.084	0.036	0.043	0.040
Log Likelihood	-8744.142	-764.208	-4378.264	-9006.084	-4759.980	-6184.265	-7066.076
F	65.778	1.520	4.368	160.120	6.427	14.593	4.572
Censored	5	1035	439	1	510	337	144

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%. All standard errors corrected for heteroskedasticity. All Kwacha values annualised, spatially deflated and in per adult equivalent terms.. † Omitted variables: Lowest consumption quartile and Central (capital) region. Tobit coefficients (not marginal effects) are presented in the above table for all models.*

Table 6.9: Marginal propensities to consume out of different sources of income, derived from Tobit models

Pooled sample														
	Food		Education		Health		Household		Farm		Clothing		Fuel	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Salary	0.048***	0.053	0.001	0.001	0.003	0.001	0.091***	0.174***	-0.001	0.021	0.012	0.009	-0.001	0.009
	(3.45)	(1.39)	(1.23)	(0.96)	(0.90)	(0.70)	(2.95)	(3.08)	(0.38)	(1.25)	(1.54)	(0.87)	(-0.35)	(1.59)
Remittances	-0.013*	0.023	0.002***	0.008**	-0.000	-0.000	-0.005	0.040	-0.004	-0.010*	0.005	0.001	0.001	0.014**
	(-1.90)	(0.95)	(3.20)	(2.14)	(0.470)	(-0.13)	(-0.49)	(1.02)	(-1.53)	(-1.91)	(1.10)	(0.03)	(0.30)	(2.19)
Farm	-0.117***	-0.75**	0.001	-0.016	-0.001	0.001	-0.043	-0.022	0.040***	0.099**	0.052*	0.038	0.028	0.012
	(-3.99)	(-2.09)	(0.46)	(-1.57)	(0.506)	(0.45)	(-0.39)	(-0.34)	(4.98)	(2.17)	(1.94)	(1.19)	(0.76)	(0.93)
Remittance receivers														
	Food		Education		Health		Household		Farm		Clothing		Fuel	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total income	-0.005	-0.006	0.002***	0.007*	-0.000	0.001	0.013	0.055	-0.001	0.018	0.014**	0.24	0.002	0.020***
	(-0.83)	(-0.43)	(3.31)	(1.95)	(-0.70)	(0.61)	(1.04)	(1.45)	(-0.66)	(1.21)	(2.42)	(1.17)	(1.42)	(3.07)
Non-receivers														
	Food		Education		Health		Household		Farm		Clothing		Fuel	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total income	0.023**	0.360*	0.001*	0.001**	0.003	0.000	0.044**	0.151***	0.001	0.001	0.005	-0.000	-0.000	0.045
	(2.19)	(1.84)	(1.81)	(2.39)	(1.29)	(0.19)	(1.65)	(8.90)	(0.56)	(0.56)	(1.05)	(-0.10)	(-0.02)	(2.29**)

*Notes: t-ratios in parenthesis, coefficients significant at * 10%, ** 5% and ***1%.*

7 REMITTANCES AS INSURANCE FOR HOUSEHOLD AND COMMUNITY SHOCKS

7.1 INTRODUCTION

Chapter 5 found evidence that one of the motivations for remitting is (co-)insurance or income pooling. This chapter looks at two household shocks (sickness and death) and two community shocks (floods and droughts), which will impact on a household's wellbeing. Household level shocks can be insured through gifts or transfers at the local level but it is difficult to insure community or covariant shocks at the local level. Instead, these will require remittances from further afield. The results show that remittances do indeed help to moderate the impact of shocks, but that the geographical source of remittances is important when remittances are viewed as insurance.

This chapter does not explicitly test for the motivations for remitting, nor for how remittances are used by recipients, but rather, focuses on one of the impacts of the remittances. Nonetheless, in a review of the motivations literature, Rapoport and Docquier (2006) show that two of the main motivations are compatible with a shock being insured: altruism and co-insurance/income pooling. As discussed in chapters 2 and 5, studies of motivations to remit have mixed results, but several papers find evidence of altruism (for example, Agarwal and Horowitz, 2002; Naufal, 2008) or co-insurance (Amuedo-Dorantes and Pozo, 2006; De la Brière et al., 2002).

In the first step, remittances are viewed as an ex post coping strategy – that is one of several coping strategies in which a household might engage following a shock. This stage models likelihood of receiving remittances from local and distant areas as a function of shocks suffered. The results show that households are more likely to receive remittances from *local* areas if someone in the household is sick (local remittances help to insure a health shock). Households that suffer from a drought are more likely to receive remittances from more *distant* areas (other districts, cities, abroad).

The second step assesses the impact of a shock on change in consumption, and shows that drought has a major negative impact on consumption growth but that distant remittances insure affected households. Local remittances, which make up most

remittance flows, are unable to insure these community shocks. Only around 10 per cent of households receive remittances from outside their home district however. Remittances help to insure consumption against health shocks, but only food consumption is insured.

Ex post coping strategies imply that a shock occurs, and the response is not necessarily anticipated by the receiving household. The consumption smoothing literature suggests that remittances are more of an ex ante coping strategy with households deliberately pooling income and sharing risks in order to smooth consumption. That is, rather than smoothing consumption over time, as in the permanent income hypothesis, these theoretical models postulate a cross-sectional equivalent in which households smooth consumption amongst themselves following shocks. Without knowing more about the motivations for remitting however, it is not possible to discriminate between these two theoretical models with the data used. For example, it might be expected that, following a shock, households receive two types of remittances: those unanticipated and motivated by altruism, and those which are received because implicit contracts require senders to remit when the receiving household suffers from a negative shock. The first could be considered part of an ex post coping strategy, and the second, an ex ante coping strategy designed to help smooth consumption. Unfortunately the data do not permit to discriminate between these different flows, and the aim of this chapter is to contribute to the understanding of one of the impacts of remittances whichever motivation is driving them. Since either co-insurance and/or altruism will be necessary to moderate the impact of shocks however, the results do suggest that remittances are, in part, driven by these motivations.

Although, in the data, it is difficult to separate ex post and consumption smoothing behavior, a modelling strategy which considers both of these allows results to be compared and, where results are similar, helps to re-enforce the overall conclusions of the study.

Finally, the study is extended to analyse the longer run impact of shocks. Results indicate that having a sick member impacts negatively on current consumption levels, but has no persistent impact. Flooding has no short run impact but a positive persistent impact – probably because more household benefit from increased rainfall than suffer from it. Drought has a negative impact on consumption *levels* in the short run, but no persistent

impact. The lack of persistent impacts is consistent with the hypothesis that in the long run, households are able to insulate themselves from the shocks using various coping strategies, including transfers.

7.2 METHODOLOGY

The empirical analysis in this chapter is based on the studies of a wide range of previous work discussed in Chapter 2. In particular, in the 7.3.1 the analysis follows Harrower and Hoddinott (2005), Fafchamps and Lund (2002) and Park (2006) in viewing remittances as an ex post coping strategy households use following a shock. As such, probits are used to model the likelihood of receiving remittances following a shock.

The second part studies the impact of shocks on change in consumption using the simple insight by Cochrane (1991) that, after controlling for various other factors, household shocks should be orthogonal to change in consumption if they are fully insured. Change in consumption is thus modelled as a function of household shocks, community shocks and various control variables. Previous studies are extended to look at remittances as one possible mode of insurance.

In addition, whether remittances are viewed as an ex post coping strategy or as a means of moderating the impact of a shock on consumption growth, the geographical source is important with community shocks requiring distant remittances, whilst household shocks can be insured closer to home.

Finally, there are a large number of econometric issues which must be resolved in order to have confidence in the results. These include the endogeneity of household characteristics, the fact that health shocks might be predictable, and the fact that health shocks might increase medical consumption. These and other econometric issues are given their own section below. More details of the econometric methods used are given in Chapter 4.

7.3 RESULTS AND ANALYSIS

7.3.1 Shocks and likelihood of receiving remittances

This section views remittances as a coping mechanism used by households following a shock. The perspective is therefore similar in nature to that of Harrower and Hoddinott

(2005), Fafchamps and Lund (2002) and Park (2006). The impact of shocks on the likelihood of household h receiving remittances, R, at time t is estimated using pooled and random effects probit models.

$$P(R_{ht} = 1 \mid x_{ht}) = \Phi(x_{ht}'\beta) \quad \textbf{(7.1)}$$

$$P(R_{ht} = 1 \mid x_{ht}, c_h) = \Phi(x_{ht}'\beta + c_h) \quad \textbf{(7.2)}$$

where x_{ht} includes all shock variables and captures observable household characteristics, and c_h includes all household specific time constant unobservables.

The selected variables are included for one of several reasons. Firstly, those that are postulated by theory to have an income on consumption or remittances are included. Thus, the main aim of the chapter is to test the impact of shocks on remittance receipts and change in consumption. Four shocks are therefore included – sickness, death, flood and drought. Secondly, variables that are traditionally included in any household level study are also included. This includes the age, sex, marital status and education of the head as well as household size. The third category can be seen as study specific, and are included for either cultural reasons (regional dummies) or econometric reasons. Thus, initial income and wealth are included since it seems reasonable to believe that initial income level may impact both receipt of remittances – depending upon remittance motivation, theory suggests that poorer households would receive more (under altruism) or that wealthier households receive more (they make better insurers and are better households to have in one's network following a shock). Wealth is entered as livestock and non-livestock indexes. These are entered separately, as previous studies (Fafchamps et al., 1998) have shown that different assets are used differently in insuring shocks.

The three final variables to be included are whether or not a household has a member in salaried employment, whether or not the head was born outside of Malawi, and an indicator of credit access. These are included because all are likely to impact on remittance behaviour. They should therefore be included in all probit regressions estimating receipt of remittances, as well as in consumption models, in order to ensure that the impact of these variables does not enter the remittance variables. Udry (1990) shows that remittances and credit are strongly interlinked, and evidence from Chapter 6

supports this; having been born outside Malawi is an indicator of access to networks, and should therefore be included in studies of remittances; salaried employment is similarly linked to networks with households with a member in salaried employment likely to be more sought after insurers, and more likely to be able safeguard themselves against shocks – particularly those of an agricultural nature.

Summary statistics for all variables included are given below.

Table 7.1: Summary statistics for variables included in models

Variable	Obs	Mean	Std. Dev.	Min	Max
Change in consumption	1270	-0.23	1.74	-8.43	5.85
Sick member	1270	0.59		0	1
Death	1270	0.04		0	1
Flood	1270	0.10		0	1
Drought	1270	0.02		0	1
Female Head	1270	0.23		0	1
Age	1270	45.73	15.57	18	97
Education (years)	1270	4.43	3.44	0	15
Initial income	1270	6.65	1.43	2.08	10.54
Household size	1270	5.98	2.49	1	16
Married	1270	0.83		0	1
Member in salaried employment	1270	0.12		0	1
Born abroad	1270	0.05		0	1
Member accessed credit in 12 months prior to round 1	1270	0.15		0	1
Received Remittances	1270	0.38		0	1
Livestock asset index	1270	0.13	1.36	-1.21	6.06
Non-livestock asset index	1270	-0.24	1.65	-2.25	11.50
Northern region	1270	0.13		0	1
Central region	1270	0.41		0	1
Southern region	1270	0.46		0	1

The analysis differs in one key respect from previous authors; this study considers separately the likelihood of receiving remittances from local areas (defined as the home village and district) and from more distant areas (outside the home district). As mentioned in Chapter 2, this analysis focuses on four shocks faced by households: death of household members, health shocks, floods and droughts. Floods and droughts capture the covariant, district level shocks. Larger scale shocks as well as regional preference and cultural differences (discussed in Chapter 1) are captured by three regional dummies representing the north, centre and south of Malawi. The main cultural, tribal and religious differences are captured by these dummies, as are the main economic differences including price differentials which tend to vary at this level and industrial make-up (Conroy et al., 2006). Round dummies are also included to capture national shocks and seasonal differences. The results are presented in Table 7.5 of the appendix to this

chapter and offer considerable support for the hypothesis that when remittances are considered as a form of insurance, geographical source matters.

Households which have suffered from recent sickness are more likely to receive remittances than other households. The models indicate that having suffered from a health shock increases the chances of receiving remittances. Regressions in which remittances from local and distant areas are pooled indicate that no other analysed shocks impact on the probability of receiving remittances. However, splitting remittances by source is revealing. Suffering from bereavement does not appear to change the probability of receiving remittances in any of the models. This might be for two reasons: firstly, all deaths are pooled. It is likely that some deaths impose additional burden on a household, attracting altruistic or insurance payments in the form of gifts and remittances. Other deaths may actually relieve pressure on household finances. These two effects may be cancelling each other out. Secondly, gifts following bereavement may involve contributing to funeral costs and are not received by households.

Weather shocks are especially revealing. Estimations show negative and significant impacts of floods and droughts on the likelihood of receiving local remittances. This result is not surprising given that most households in the local area would also have suffered from these shocks. However, all model specifications show that the probability of receiving remittances from outside a household's home district increases following droughts. Suffering from a drought increases the probability of receiving remittances from outside the home district whilst the same shock reduces the probit of receiving local remittances.

These results help to confirm the central hypothesis of this work: that geographical source is an important consideration when remittances are viewed as having a role as insurance. Covariant or community shocks require risk pooling with individuals living further away from home where weather patterns are uncorrelated with those of the home district. Idiosyncratic shocks such as sickness can be insured either close to home or further away.

It is interesting to note though, that the coefficients on sickness are significant at the five per cent level for local remittances but marginally insignificant for distant remittances.

This suggests that sickness shocks tend to be insured closer to home. There are two reasons why this might be the case. Firstly, sickness is likely to require immediate funds to pay for medical treatment, food, or other assistance. Local remittances will therefore be more effective in an environment in which transferring funds can carry large transaction costs in terms of time and money. Secondly, Posner (1980) notes that it is reasonable to assume that in the case of health shocks the problem of information asymmetry between the remittance sender and receiver is reduced closer to home. Coate and Ravallion (1993) note that the lack of privacy in rural areas of developing countries helps to overcome problems associated with information asymmetry, whilst Fafchamps (1992) discusses punishment of cheaters. He notes that although each household might insure themselves with several other households, each of these will be, in turn, connected to other households. Within a village context, any deception (with regards to the degree of sickness, the impact or the ability to insure oneself through [hidden] wealth), if discovered, will be punished by those who are best informed, that is, the closest people in the insurance network. This can be a signal to others to avoid informal insurance contracts with the cheating household, exacerbating the economic and social punishment.

Since a household has more privacy from a remittance partner living further away, the chances of being caught cheating is lower. In addition, the punishment for being caught cheating is potentially lower as the household is likely to lose only that partner, and not the whole village.

It is interesting to note that there is no significant correlation between receiving local and distant remittances, either with values, or indicator variables. This orthogonality suggests that receipt of these two forms of remittances are independently determined, however, making such an assumption in a model is liable to introduce a simultaneity bias. This relationship was therefore tested by introducing lagged local remittances into models estimating distant remittances, and lagged distant remittances into models estimating receipt of local remittances. In all cases, the lagged variables were insignificant, and no other results of interest changed.

A number of interesting results can be observed from the control variables. Households with female heads are more likely to receive distant remittances, however, the female head dummy is insignificant across all models with respect to receiving local remittances.

Thus females are more likely to receive remittances from distant areas, but not local areas. Due to the nature of the survey, a household would have been registered with a de facto female head if the husband worked away from home and sent back remittances, and it seems likely that this is the explanation in this case. In Chapter 5, the gender dummy was significant in only one case; males were less likely than females to receive remittances from their parents. Gender was not a significant determinant of remittance receipts for other relationships.

Age has a positive effect on receiving both local and distant remittances[33]. This could reflect a use of children as "pension providers" for their parents suggesting inter-generational bargaining. Alternatively, in the absence of an overall health variable, age might capture the deteriorating health of the household head and his/her increasing reliance on altruistic remittance.

Households whose heads were born abroad are less likely to receive remittances than other households. This might seem counter-intuitive at first glance, but it could be that those who move abroad tend to cut ties with their families and friends in their home countries, but do not have significant family or social networks inside their adopted country to compensate.

The log of per capita income is positive for distant remittances but negative for local remittances. Thus, richer households are less likely to receive from their neighbours but more likely to receive from family/friends outside of their home network. In addition, education is positive and significant for distant remittances, but not for local remittances. These results might be for one of several reasons. If wealthier households are more likely to be educated and to educate their children/siblings, it seems likely that these children/siblings can profit more easily from higher wages in cities or abroad. Equally, wealthier households will be more able to afford migration costs of family members, or indeed, friends. These households will be more likely to receive remittances from distant areas. A negative sign on income for local remittances is likely to simply be an indication of the fact that these households are less likely to receive "altruistic" remittances. It is

[33] A square was initially included but this was consistently insignificant so was dropped from this analysis in the interests of parsimony.

interesting to note however, that the asset indexes included (livestock and other), are rarely significant.

Having accessed credit is positive for local remittances but not for distant ones. The link between credit and remittances is potentially ambiguous. Receiving remittances might reduce the need to access credit (if they are substitutes), but might also reduce household income risk, increasing the demand for credit. In addition, receiving remittances might encourage lenders to lend. Finally, remitters might remit to those who are unable to access credit when required. Richter (2008) studies the impact of receiving remittances on household credit demand and finds that remittances have a positive impact on the likelihood of applying for a loan. Udry (1990) finds that the distinction between credit and remittances is not clear with repayments of a resource (money/gift) being dependent on the relative fortunes of the giver/lender and receiver/borrower. Given these relationships, it is difficult to interpret this variable as causal in any sense. If loans tend to be made locally, and the distinction between remittances and credit is unclear as Udry (1990) suggests, then respondents may have reported any gift as part loan and part gift, resulting in the positive relationship shown.

Households with a member in salaried employment are more likely than others to have received local remittances but not more distant remittances. It could be that those with such employment make better insurers, encouraging others to remit insurance "premiums" to them in the form of remittances, generating this positive coefficient.

7.3.2 Do remittances insure consumption?

7.3.2.1 Estimation method and econometric issues

This section views remittances as consumption insurance and estimations are based on the models outlined and the empirical insights described in Chapter 2. Interaction variables are included as shown in (2.23) to assess the moderating impact of remittances following shocks. In addition, separate regressions are estimated for remittance receiving and other households.

This study follows the majority of authors in analysing food and non-food consumption (excluding durables) separately. Asset Indexes for livestock and other assets are entered separately due to the importance previous authors have attached to livestock in

smoothing consumption (Fafchamps et al., 1998). The impact of shocks is tested for directly, rather than through income. This allows the study to avoid attenuation bias whereby measurement error in income leads to downward biasing of coefficients (Deaton, 1997, 3rd ed.: pp.99-100) and to assess directly the impact of different shocks. As is standard, change in logged per capita consumption is used for each household as the dependent variable.

Several important econometric issues need to be addressed, with a large proportion of these especially relevant for health shocks. For example, it is useful to verify that results are robust to analysing food and non-food consumption separately and excluding health expenditure since a health shock may result in increased food or health consumption. Secondly, if health shocks are predictable, then households which anticipate them may decrease consumption in time t-1 and save in order to increase consumption in time t resulting in a positive impact of health shocks on consumption change. Results are therefore verified by excluding all households for which health shocks can be correctly predicted using household characteristics. Thirdly, health shocks may actually be a function of consumption change for poorer households. It is therefore useful to verify that results are robust to excluding the poorest 25 per cent of households. Forth, self-reported health shocks may contain non-random errors related, especially, to education or unobserved characteristics. It is therefore important to control for education and other household characteristics, and to verify results using fixed effects models.

Other potential issues, not necessarily related to health shocks include the endogeneity of household characteristics. This is solved by using initial household characteristics as in Dercon et al. (2005), and verifying that results are robust to fixed effects. There is a risk that error terms for households living in the same area are clustered due to suffering from the same community shocks, or preferences. Finally, White (1980) corrected standard errors are presented to correct for potential heteroskedasticity. These problems and solutions or robustness tests undertaken are summarised in Table 7.2 below.

Table 7.2: Potential econometric issues and correction or robustness test undertaken

Potential Econometric Issue	Correction or Robustness Test
Unobserved heterogeneity	• Use White corrected standard errors
Clustering of errors in small geographical areas	• Report standard errors that correct for clustering. • Include Round and Regional Dummies as well as district level shocks
Endogeneity of household characteristics	• Use initial household characteristics • Verify results robust to fixed effects
Self-reported health shocks contain non-random error	• Verify results robust to fixed effects • Control for education and other household characteristics
Health shocks are predictable	• Run a probit to predict health shocks, then re-run basic regressions excluding correctly predicted health shocks
Health shocks increase health (and food?) consumption	• Verify results estimating food and non-food separately and exclude health consumption from dependent variable
Health shocks may be simultaneously determined with change in consumption for those with low consumption levels	• Estimate excluding households in bottom 25% of per capital consumption levels which have suffered negative consumption growth.

7.3.2.2 Econometric results

Table 7.6 reports results based on (2.20) and (2.23), and repeated here for convenience:

$$\Delta \ln c^h_{t,v} = \alpha + \beta S^h_{t,v} + \delta S_{t,v} + \varphi X^h + \varepsilon^h_{t,v} \quad \textbf{(7.3)}$$

$$\Delta \ln c^h_{t,v} = \alpha + \beta S^h_{t,v} + I_1[\alpha_{I_1} + \beta_{I_1}(S^h_{t,v})] + \delta S_{t,v} + I_2[\alpha_{I_2} + \delta_{I_2} S_{t,v}] + \varphi X + \varepsilon^h_{t,v} \quad \textbf{(7.4)}$$

where $S^h_{t,v}$ indicates a shock suffered by household h in village v at time t, X captures all household characteristics, I_1 represents interaction terms for household shocks, $S^h_{v,t}$, and whether or not a household received remittances and I_2 interactions for community shocks, $S_{v,t}$ and whether or not remittances are received. All estimates report standard errors robust to heteroskedasticity (White, 1980) and clustering (Deaton, 1997, 3rd ed.: pp.74-78) and use initial household characteristics to eliminate potential endogeneity. Column 1 in Table 7.6 in the appendix to this chapter presents a simple estimate of (7.2) and can be viewed as the base regression. Under full insurance a shock would not have a significant impact on consumption change so that a zero coefficient would be expected on the shock.

This estimate shows that drought has a strong negative impact on consumption growth. Droughts are covariant in nature and are therefore difficult to insure. The coefficient on health shocks is positive and significant. This is counter-intuitive at first glance, however this result is not entirely illogical. Irac and Minoiu (2007) note that a positive and

significant coefficient on a shock variable might be the result of over-insurance, or of preference change. Column 1 does not test for the source of insurance and it is possible that health shocks are met with increased health and food consumption, and this increase may be financed (insured) through lower savings or remittances.

Death and floods do not significantly impact on consumption growth. This can be interpreted as evidence that although these shocks impact on total income excluding remittances, remittances then increase to cover the impact. Alternatively put, they are adequately insured and do not therefore impact on consumption. Other explanations are possible in this case however. Death may not have any impact *on average* because the variable is unable to distinguish between the death of different members, some of whom may increase burden on a household whilst living (e.g. the very old, or HIV positive), and others whose death increases the burden (healthy prime age working adults). The nature of the flood variable makes it difficult to capture differences between households at the centre of the shock whose crops have been entirely destroyed, and those who live around the periphery. This latter group may actually benefit from the increased rainfall thanks to better quality land, or living on the edge of the area affected. These two groups should exhibit opposing signs, but the data do not, unfortunately allow the study to distinguish between them.

A number of other interesting results can also be seen in column 1. The log of initial income is negative and significant throughout Table 7.5. This can be interpreted in the same way as initial income in macroeconomic growth models. The higher starting income is, the lower is consumption growth – there is thus some evidence of a closing gap between lower and upper income groups.

The issue of consumption convergence deserves greater discussion. The below graphs show that consumption convergence can also be seen in the descriptive data. Figure 7.1 shows that there was a large decrease in average consumption from the first to second rounds for those that were in the top quartile in the first round. Although this might be partly explained by people moving between quartiles, the same pattern can be seen when re-categorising each household depending upon their consumption in each round. After the initial fall, the consumption level increases for the highest quartile over the following rounds.

Figure 7.2 reproduces the graph for the lower three quartiles for clarity. This shows a clear increase in consumption levels for the lower two quartiles. The third quartile suffers from an initial fall followed by an increase thereafter.

Figure 7.1: Mean Consumption Over Rounds (1)

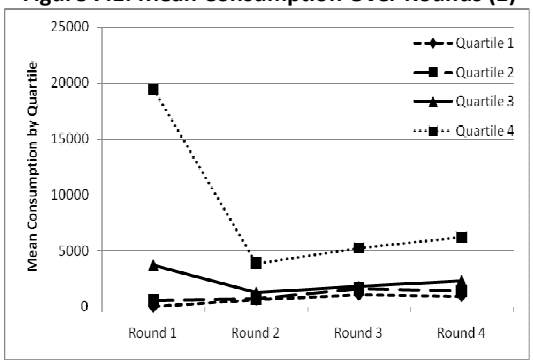
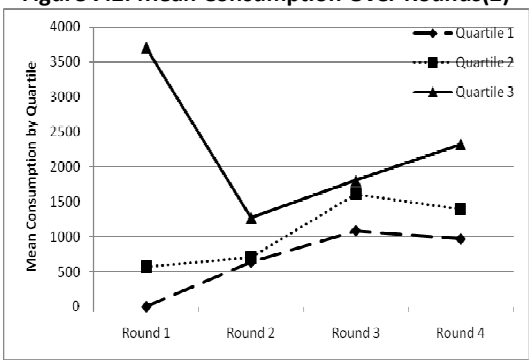


Figure 7.2: Mean Consumption Over Rounds(2)



The pattern exhibited by the top two consumption quartiles suggests that there are data issues which may need to be addresses. In particular, the issue of high consumption outliers may be of importance. However, excluding even the top 20 per cent does not alter this pattern indicating that these patterns are robust to outliers. Put simply, there are a large number of households which reported very high consumption levels in Round 1, which did not report the same high levels in following rounds. One question that arises is whether the richer households dropped out of the survey, but this does not appear to be the case with these households reporting similar levels of response in following rounds to the average. Two possibilities remain: the first is that these high first round levels of consumption for this group (or, indeed, the lower consumption levels for future rounds) are due to data collection errors. However, there is no indication that this might be the case. The second is that the high consumption levels for this group are genuine – possibly related to some economic factors. There is no obvious change however that might have resulted in this apparent decline in consumption. The growth in consumption levels of the lower quartiles is believed to be genuine gains. Education has a positive impact on consumption growth indicating that the better educated are able to continually increase their per capita consumption levels. Age and age squared are both insignificant. Household size is negative – other things being equal larger households at the start of the survey exhibit lower per capita consumption growth (perhaps because they tend to keep getting larger).

Having been born abroad increases consumption growth suggesting that, on average, those that migrate are able to take advantage of their new environment to increase consumption levels. The previous section noted that migrants were less likely to receive remittances. Their increased consumption growth compared with other households suggests that they do not need to rely on remittances to maintain their standard of living.

A household's livestock index is negatively related to consumption growth – households with more livestock have lower consumption growth. This is somewhat surprising since it suggests that asset rich households grow at a lower rate than other households. This is in line with the negative coefficient on income, but counter-intuitive. Assets should be a springboard to increased consumption, but this does not seem to be the case. It could be that households with more assets are those which choose to save or invest more, thereby reducing consumption growth. Without more information, it is not possible to assess this further.

Finally, a dummy indicating whether or not a household receives remittances is insignificant. Since receiving remittances does not contribute to consumption growth, it likely that some other loss offsets this, offering evidence that remittances rarely over-compensate the loss resulting from a shock. The low r2 values are disappointing but are around the average values found by other authors.

Next, the hypothesis that remittances act as insurance for shocks is investigated. Chapter 5 found some evidence that one of the motivations for remitting is indeed co-insurance. In addition, the probit models above show that a household is more likely to receive remittances if they have suffered from certain shocks. It seems likely therefore, that one should be able to find evidence that remittances help to moderate the impact of shocks on consumption growth.

Column 2 in Table 7.6 augments the original model to include interactions between each shock, and between whether or not a household receives remittances from local areas (RemLocal) or distant areas (RemDistant), as described in (7.3). The results strongly support the findings in the previous section in which remittances are viewed as an ex-post coping strategy. That is, for those who receive them, distant remittances can help to insure covariant shocks. Droughts have a strong negative impact on consumption growth,

however households that receive distant remittances appear to be fully insured. The possibility cannot be ruled out that the coefficient on Drought and the interaction term Drought*RemDistant sum to zero in columns (2) or (3) (with p-values of 0.8894 and 0.8652 respectively).

Households that suffer from drought and receive local remittances actually appear to have lower consumption growth than households that do not. It is perhaps only the hardest-hit households that the local community remit to following such a negative shock.

These results are confirmed by estimating the model separately for households that do and do not receive remittances from local and distant areas. Droughts have a strongly negative and significant impact on consumption growth for households that do not receive remittances from outside of their home district whilst this variable is insignificant for households which do. Regardless of whether or not a household receives local remittances, drought has a negative impact on consumption growth, with the impact again, being stronger for those that reported receiving local remittances.

As in model (1), having suffered from a flood does not have an impact on consumption growth. As before this might be either because such shocks are fully insured or because it is not possible to observe the extent to which any given household was impacted on by the flooding with some potentially benefiting whilst other lost.

As in model (1) and all probit models in the previous section, death is insignificant. Reasons for this were expanded on in the previous section when remittances are viewed as an ex post coping strategy. When the sample is split into those that do and do not receive distant remittances, this variable turns significantly negative: a death has a negative impact on household consumption growth. One can only speculate as to what the reasons might be. One explanation for this might be that distant remittances are sent, partly, to help support a long-term sick household member who subsequently dies. The resulting loss of remittances impacts on household consumption. In this case, a long-term sickness would have little impact on change in household consumption whilst the death would, helping to explain why this is captured by death and not health shocks.

As in regression (1), health shocks increase consumption growth, but, somewhat surprisingly, local remittances appear to actually act to *reduce* this consumption growth. It could be that it is those that suffer from the worst health shocks that tend to receive local remittances, and also see a big decline, or lower growth, in consumption. Local remittances would then follow for those with the worst sicknesses, but would not fully insure the consumption increase necessary. Unfortunately, it is not possible to assess the impacts of different types of health shocks. This study is able to investigate further the results however, and in light of this surprising outcome and the econometric problems associated with health shocks, it is to this that this thesis now turns. The impact of the predictability of health shocks is investigated, followed by the hypothesis that increased health and food consumption are responsible for the unexpected results associated with health shocks.

7.3.2.3 Predictability of health shocks

This chapter now turns to one of the econometric issues discussed above; that of the predictability of health shocks. If health shocks can be predicted in advance, then previous consumption habits may have changed. For example, households which are able to predict a health shock may have saved more in time t-1 and spent it in time t. This would cause health shocks to have a positive impact on consumption change.

In order to verify the results, this analysis follows the methodology of De Weerdt and Dercon (2006) who test the robustness of their initial results by excluding all households for which health shocks were predicted correctly by an initial probit regression. The original basic regressions are re-estimated excluding all correctly predicted health shocks from the sample. Although this may result in some selection bias, the aim here is to test whether this group of households, which are able to correctly predict health shocks, are driving the results. Such an analysis necessarily excludes the influence of these households. Results from both the probit, predicting health shocks, and the re-run pooled OLS are presented in Table 7.7 in the appendix to this chapter.

The results are highly supportive of the argument that the predictable nature of health shocks does not alter the key conclusions of the basic regressions. That is, drought has a large negative impact on consumption growth, or, put another way, that it is a largely uninsured shock, whilst having a sick member increases consumption growth. Interestingly, the coefficient on flood shocks remains positive and is now (marginally)

significant. This is likely to reflect characteristics of the households that remain in the regression. In particular, this group may own land in areas that is likely to be less affected by flood damage, but in a better position to benefit from increased rainfall. It is not known why this might be the case. Given the similarity of these results to the initial regressions, the study continues the analysis with the initial sample, maximising the number of observations included.

It is interesting to note a number of the results from the probit models predicting health shocks. Floods have a positive impact on the likelihood of a household suffering from a health shock, whilst droughts have a negative impact. Floods bring with them a large number of insects which help to spread disease, while droughts do not offer a friendly environment for insects. It is somewhat surprising that per capita consumption level does not appear to impact on the probability of suffering from a health shock. It is likely that behaviour, sanitary facilities and weather conditions are responsible for health shocks at all levels of consumption. The impact of sanitary facilities is picked up by a negative impact on probability of health shocks of non-livestock assets. Finally, household size has a positive impact on the likelihood of a member suffering from a health shock. This is intuitive; more members increase the likelihood that any one of them will fall ill.

7.3.2.4 Food versus non-food consumption

Given that the predictability of health shocks does not appear to have been responsible for the unexpected positive impact of health shocks on consumption growth, it is now useful to turn to the hypothesis that increased food and health consumption following a health shock are driving the positive coefficient on this variable. Separate regressions are run for food consumption, non-food consumption and non-food consumption excluding health. This makes the assumption of separable utility between food and non-food consumption. Nonetheless, other authors find evidence that this is likely to be the case (Dubois and Lignon, 2005), and this risk is the price paid for increased information. In addition, this test is of particular importance since it is possible that essential consumption such as food is more likely to be insured against shocks than non-essential consumption. Results are reported in Table 7.8 of the appendix to this chapter.

Columns 1 and 3 show that the impact of a health shock on food and non-food consumption remains positive and significant. It is noteworthy however that a health shock appears to impact to a greater extent on food consumption growth than on non-

food with the difference being statistically significant at the 10 per cent level (t≈1.87) for the regression excluding interaction variables. It is possible that health shocks are over-insured, especially with regards to food consumption and it could be that food consumption is over-insured but not through remittances. It would be a separate study to understand the source of the insurance. For example, are savings used to insure food consumption? Are (potentially productive) assets sold? Do household members sell sex? Excluding health expenditure from non-food consumption does not alter this conclusion.

Interaction variables are again consistently negative for health shocks but are significant only in the case of non-food consumption, including medical expenses. It therefore appears that medical expenditure is a major factor behind the negative and significant coefficient on the Health shock*Local remittances interaction term. If health shocks requiring the largest amount of medical treatment (and therefore expenditure) are the ones that attract local remittances, and, as seems likely, impact most on household income, but these remittances cover only a small proportion of the lost income, then these shocks will have a negative impact on medical consumption. Thus, households will suffer a sever enough income shock to attract local remittances, but will actually be forced to decrease medical expenditure since the increase in remittances is less than the loss of income. In order to purchase other (non-food) essentials (e.g. paraffin, blankets), medicine is actually foregone.

As before, drought has a strong negative impact on change in food consumption and unsurprisingly impacts on food consumption growth more strongly than non-food consumption. The interaction variable between Drought and Distant Remittances is positive for food consumption, indicating that for those that receive distant remittances, food consumption is insured against this shock. Non-food consumption however, is not insured by distant remittances with this variable actually turning significantly negative.

Both flood and death are again largely insignificant. There are two exceptions: in column 3, flood has a positive impact (significant at the 10 per cent level) on non-food consumption when interactions are not included. This is likely to be driven by households on the periphery of a flood who benefit from the increased rainfall. Their increase agricultural income will pay for other, non-food items.

Death*RemDistant is negative and significant for food consumption. That is, households that have suffered from a death and receive distant remittances have lower income growth than other households. This is consistent with the result in Table 7.6, which gave a similar result for total consumption, and is discussed above.

7.3.2.5 Fixed effects

Although all regressions have controlled for household characteristics, there remains the possibility that there exist unobserved characteristics that are positively correlated with both consumption growth and reported health shocks. This is likely to be the case if self-reported health shocks are reported with error. Under the assumption that an individual's measurement error is constant over the short period of the survey (around three years), it is possible to control for this effect using fixed effects. Results are therefore verified using fixed effects panel models. Results are reported in Table 7.9 of the appendix to this chapter.

The major conclusion is that previous results are robust to fixed effects; indeed the value of the coefficient on health shock has increased and is still highly significant. These results should be interpreted with some caution due to the lack of variability over the short time period. Nonetheless, the key conclusions remain unchanged: drought impacts negatively on per capital consumption growth; distant remittances can help to moderate the impacts of drought; having suffered from a health shock is positively associated with consumption growth and receiving local remittances is actually associated with reduced consumption growth.

In addition, as before, there is a negative association between death and consumption growth for households that receive distant remittances, but not for other households.

One key change can be found with regards to flooding. Previously insignificant, the Flood*RemDistant interaction term is now positive so that households that both suffered from a flood and received remittances from outside of the home district actually increased their consumption growth.

7.3.2.6 Excluding the extreme poor

Table 7.10 in the appendix to this chapter presents results for results for regressions which exclude all households in the bottom 25 per cent of per capita consumption which

also suffered from negative consumption growth. This group could be classified as the "extreme poor" and is the group for which changes in consumption level are potentially endogenous. That is, the group for which a consumption decrease might cause the health shock. In the absence of suitable instruments, the aim here is to show that the key results are robust to excluding all potentially endogenous observations.

The values of the coefficients on health shocks are lower than in previous estimates but remain positive and significant. The fact that they are lower is due to the fact that the poorest households are forced to increase their consumption by more, in proportional terms, in order to cope with a health shock. The main conclusions remain unchanged.

In order to understand in greater depth the impact of a health shock on consumption, this study needs to take another approach. In particular, it attempts to understand whether it matter *who* in the household suffers from the shock.

7.3.3 A Focus on health shocks

7.3.3.1 Overview

This section aims to "drill down" into the impact of health shocks on consumption. In particular, it aims to understand whether different members' health shocks are treated alike, and whether male and female headed households differ significantly in their behaviour. This section focuses on health due to the results previously obtained, and the prevalence of these shocks.

Over 50 per cent of all households suffered from health shocks over the two weeks prior to being interviewed. Table 7.3 below shows that adults are more likely to have been sick than children with 29 per cent of households having had a sick adult female, and 22 per cent a sick adult male. Ten and 12 per cent of households reported a sick girl and/or boy respectively.

Table 7.3: Percentage of households suffering health shocks

Health shock	Obs	Mean	Min	Max
Any member	2355	54.0%	0	1
Adult female	2355	29.3%	0	1
Adult male	2355	21.8%	0	1
Girl*	2355	10.4%	0	1
Boy*	2355	11.7%	0	1

*Children are defined as being under 15 years

Table 7.4 below shows correlations between health shocks and remittance receipts from the local community and distant areas. The major and most robust conclusion is that health shocks on children are positively associated with remittances from the local community, but not from further afield. There is also some suggestion that female health shocks are positively associated with remittance receipts, especially from the local community. There are no significant correlations for adult male health shocks. Although not conclusive, this might suggest that remittance senders behave more altruistically towards children who suffer from health shocks than towards adults who do so.

Table 7.4: Correlations between health shocks and remittance receipts

	Health shock			
	Male	**Female**	**Boy***	**Girl***
Local remittances (dummy)	-0.0331	0.0584*	0.0840*	0.0674*
Distant remittances (dummy)	-0.0276	0.0369*	-0.0008	-0.0041
Local remittances (value)	0.0104	0.0331	0.0703*	0.0421*
Distant remittances (value)	-0.0157	-0.0133	-0.0028	-0.0093

*Children are defined as being under 15 years

7.3.3.2 Empirical results

The same models are used as used in previous sections with several key changes. Firstly, the data permit to ascertain not only whether the household as a whole suffered from a health shock, but also to decompose this into four categories: adult male, adult female, girl and boy. This makes it possible to assess the impact of a health shock for different household members. In addition, the sample is decomposed into male and female headed households to allow for separate treatment of the responses to health shocks. Results from the initial OLS regressions are reported in Table 7.11 and offer some interesting insight into the behaviour of households when different members suffer from health shocks.

Sick children and adult males impact positively on food consumption and non-food consumption. Excluding health from non-food consumption causes the coefficient on sick adult males to turn insignificant. This suggests that when children and adult males are sick, they benefit from increased food and health consumption. In addition, children benefit from increased non-food consumption apart from health. The coefficient on health shocks for adult females is negative and insignificant; adult females who suffer from health shocks do not benefit from increased consumption in any category.

The study next assesses whether this behaviour is constant between male and female headed households. Results are reported in Table 7.12. In male headed households, children and adult males who suffer from health shocks appear to benefit from increased food and health consumption, and children benefit from increased other non-food consumption. In male headed households all coefficients on sick adult females are insignificant. Females who suffer health shocks appear not to benefit from increased consumption.

In female headed households however, these results are reversed. Adult females who suffer health shocks benefit from increased food consumption, but not non-food consumption, whilst there is no impact on consumption growth of health shocks amongst adult males. It could be that a male who suffers from a health shock in a female headed household gains little because the whole household suffers. This is likely to be the case where an adult son is earning a wage which contributes to the family pot.

In addition, in female headed households, girls benefit more than boys from increased health and other non-food consumption following a health shock. This suggests that female heads tend to favour girls over boys.

7.4 AN EXTENSION: DO SHOCKS HAVE A PERSISTENT IMPACT ON CONSUMPTION?

It is possible to answer one final, related question using the same data and similar methodology to that outlined in Chapter 2 and above: to what extent do shocks have a persistent impact on consumption? Similar tests to Dercon et al. (2005) are performed and, to the best of the author's knowledge, this is one of only a few such tests and the first using Malawian data.

The econometric model is based on Dercon et al. (2005). Since it is likely that ability to cope with a shock is correlated with likelihood of suffering from the shock, resulting is an endogeneity problem, health shocks are instrumented using lagged per capita income and the number of household members aged over 55 years. The model is specified as:

$$\ln c^h_{t,v} = \alpha + \beta_1 S^h_{t,v} + \beta_2 S^h_{t-1,v} + \delta_1 S_{t,v} + \delta_2 S_{t-1,v} + \varphi X^h + \varepsilon^h_{t,v} \quad \textbf{(7.5)}$$

where $c^h_{t,v}$ is the current consumption level at time t for household h in village v. $S^h_{t,v}$ and $S^h_{t-1,v}$ indicate household level shocks at time t and t-1 respectively and $S_{t,v}$ and $S_{t-1,v}$ are community shocks. Control characteristics including round and regional dummies, X, are included, ε is the error term. All estimations correct for unobserved heterogeneity using White (1980). Other control variables used include the age[34], sex, education and marital status of the household head and whether s/he was born abroad. In addition, household size, income, access to credit and employment status as well as assets are controlled for. Results are presented in Table 7.13 in the appendix to this chapter.

The over and under identification tests pass all relevant tests. That is, the instruments are positively correlated with the instrumented variable, sick member but are not correlated with the error term.

Recent health shocks have a negative impact on current consumption levels. This is in line with Dercon et al. (2005). However, the lagged health shock dummy is insignificant. This suggests that households in rural Malawi must bear the short run costs of health shocks, but in time, are compensated for persistent effects through risk-pooling mechanisms or self-coping strategies. It is likely though that one of the coping strategies is short term consumption reduction.

Recent droughts have a negative impact on current consumption. Like health shocks however, the lagged shock is not significant suggesting that households are able to insulate themselves from the persistent impact of droughts.

Recent floods do not have a significant impact on consumption levels. However past flooding does appear to have a persistent and *positive* impact on current consumption level. This might appear counterintuitive but is in line with Irac and Minoiu (2007) and Dercon and Krishnan (2000) who find that weather shocks impact positively on consumption. In addition, the variable reports flooding at district level. It is likely that some households suffered from this but that other households, at the periphery of the flooding zone actually benefited from the increased rainfall. Their harvest and therefore

[34] Age squared is also included in this regression since it is significant indicating a quadratic relationship in consumption levels over the lifecycle, as expected.

consumption would increase in periods following this shock, causing the lagged flooding indicator to exhibit a positive impact on consumption levels.

Certain control variables deserve brief discussion. The results confirm the fact that female headed households tend to have lower per capita consumption levels than the average. Increased education is associated with higher per capita consumption, as is increased non-livestock asset ownership. Accessing outside finance in the form of credit or remittances unsurprisingly increases consumption. Coefficients on age and age squared are respectively positive and negative, helping to confirm the lifecycle consumption model (without perfect consumption smoothing). Finally, larger household size is associated with lower per capita consumption.

7.5 CONCLUSION AND FURTHER EXTENSIONS

This chapter has looked at remittances as insurance for two types of household and two covariant shocks. Evidence is presented that households are more likely to receive remittances from distant areas if they have suffered from a drought, but more likely to receive them from local areas following a health shock. Household shocks might be better insured close to home whilst remittances from more distant areas are essential in order to moderate the impacts of drought shocks suffered by the whole community. Unfortunately only around 10 per cent of all households in the sample benefited from such transfers.

Amongst the shocks, drought has a consistently negative impact on consumption change but it is not possible to rule out the possibility that, for those that receive them, distant remittances entirely counter the negative impact. Despite various robustness tests, the results show that a health shock tends to actually increase a household's consumption growth. Drilling down deeper into health shocks the study reveals a number of interesting results.

Children and adult males appear to benefit from increased food and health expenditure when they are sick. The same is not true for adult females however. When male and female headed households are analysed separately, females benefit from increase food consumption when they are sick only in female headed households, whilst males benefit only in male headed households. Girls tend to be favoured over boys in female headed households.

The results suggest that remittances can act as insurance for shocks. This suggests that remittances are likely to be motivated, at least in part, by altruism or deliberate (co-)insurance or income pooling since both motivations would achieve the result found (Rapoport and Docquier, 2006).

The results have important policy implications. They suggest that informal insurance systems already exist in rural Africa, and that governments introducing any social welfare programmes need to be careful not to displace these. In addition, it seems unlikely that states are better able to detect "need" than local African communities. The fact that few households are able to insulate themselves against covariant shocks indicate that government and donor resources could be well used in this area. Weather shocks are largely exogenous to household behaviour minimising any moral hazard impacts[35]. Finally, although household shocks can be devastating to uninsured households, community shocks can devastate entire communities, setting back "development" several years as productive resources are sold, amongst other negative impacts (e.g. increased crime, prostitution). The results in this study therefore indicate that scarce resources should be directed towards insuring exogenous, community shocks.

Studying the persistent impact of shocks, there is evidence that households suffer in the short run from sickness and drought, but in the long run, their coping mechanisms appear to ensure that these shocks to do not have a persistent impact.

The results in each of the three sections are relatively consistent. For example, droughts impact negatively on consumption change and on current consumption levels. Remittances from distant places are shown to moderate the negative impact of droughts on consumption change, and those that suffered from droughts are more likely to receive distant remittances. However, some differences deserve discussion.

Households that suffer from a health shock are more likely to receive local remittances. However, health shocks have a negative impact on current consumption levels, but not on long run consumption. This suggests that households are unable to insure current

[35] Certain moral hazard issues remain – for example, if households know that they are 'insured' in the event of drought, they may make less efforts to irrigate land.

consumption, but that they have coping mechanisms in the shorter run. That a household suffering from a health shock is more likely to receive remittances suggests that these are one coping mechanism, but that this takes time to work. However, although there appears to be a negative impact on current consumption *levels*, there is actually a positive impact on consumption *growth*. That is, households that suffer from a sickness have lower consumption levels, but higher consumption growth following a health shock. The results suggest that the increased consumption growth is a result of males and children increasing their food and medical consumption when they are sick.

Nonetheless, the necessary conclusion that consumption levels are lower following sickness but higher than they would have been without sickness makes these two results difficult to reconcile. It would suggest that households that get sick are the ones with decreasing consumption levels, who then receive remittances following sickness which help to increase consumption levels. Indeed, excluding those households in the lowest 25 per cent of income levels that suffered a decline in consumption levels reduced the impact of health shocks on consumption change by around half. It could be that the lowest 25 per cent should be extended to 50 per cent, or some other number. The bottom 25 per cent however matches well with the Malawian National Statistical Office "food poverty" line, making this the obvious choice.

This study offers several natural extensions. Firstly, this analysis does not study other coping mechanisms used by households. Understanding the extent to which different options are used for different shocks would be interesting. Secondly, in light of the findings in Chapter 5, it would be interesting to understand not only the importance of the geographical source of remittances, but also how this interacts with the relationship between the sender and receiver; who insures which shocks and where do they live? This degree of disaggregation is likely to require a larger data set. Thirdly, it would be useful to show that the main conclusions drawn within the context of the study of the impact of shocks on consumption growth are robust to any potential endogeneity if suitable instruments can be found for health shocks.

Table 7.5: Probit models estimating probability of receiving remittances from different sources

	Pooled probit: Likelihood of receiving remittances			Random Effects probit: Likelihood of receiving remittances		
	Total	Distant	Local	Total	Distant	Local
Sick member	0.174***	0.131	0.161**	0.187***	0.141	0.171**
	(3.023)	(1.554)	(2.461)	(2.799)	(1.465)	(2.465)
Death	0.132	0.066	0.129	0.151	0.080	0.142
	(0.893)	(0.263)	(0.930)	(0.943)	(0.363)	(0.867)
Flood	-0.147	0.103	-0.310***	-0.181	0.142	-0.340**
	(-1.213)	(0.631)	(-2.663)	(-1.414)	(0.801)	(-2.446)
Drought	-0.083	0.506**	-0.527*	-0.066	0.525*	-0.523*
	(-0.380)	(2.023)	(-1.759)	(-0.279)	(1.840)	(-1.884)
Log per capita income	-0.014	0.071***	-0.045*	-0.015	0.072**	-0.046**
	(-0.630)	(3.212)	(-1.887)	(-0.722)	(2.322)	(-2.096)
Female head	0.256***	0.523***	0.041	0.267**	0.606***	0.040
	(3.069)	(3.927)	(0.421)	(2.490)	(3.828)	(0.362)
Age	0.008***	0.012***	0.004*	0.008***	0.013***	0.004*
	(3.080)	(3.348)	(1.810)	(3.502)	(3.683)	(1.813)
Education (years)	0.024*	0.056***	0.003	0.027**	0.066***	0.004
	(1.917)	(2.867)	(0.303)	(2.208)	(3.520)	(0.338)
Household size	-0.012	0.012	-0.016	-0.014	0.011	-0.017
	(-0.726)	(0.541)	(-1.045)	(-0.881)	(0.495)	(-1.083)
Married	-0.062	-0.083	-0.079	-0.062	-0.071	-0.082
	(-0.571)	(-0.413)	(-0.750)	(-0.506)	(-0.408)	(-0.659)
Member in salaried employment	0.163	-0.125	0.282**	0.169	-0.140	0.291***
	(1.252)	(-0.678)	(2.502)	(1.507)	(-0.788)	(2.591)
Born abroad	-0.412***	-0.457**	-0.288**	-0.438***	-0.528*	-0.298*
	(-3.188)	(-2.155)	(-2.208)	(-2.619)	(-1.878)	(-1.777)
Accessed credit in 12 months prior to round 1	0.253***	0.037	0.329***	0.265***	0.065	0.341***
	(2.767)	(0.385)	(3.489)	(2.576)	(0.421)	(3.311)
Livestock asset index	0.006	0.058	-0.024	0.004	0.069*	-0.027
	(0.201)	(1.559)	(-0.773)	(0.158)	(1.730)	(-0.933)
Non-livestock asset index	-0.019	-0.019	-0.024	-0.021	-0.025	-0.025
	(-0.810)	(-0.779)	(-1.011)	(-0.811)	(-0.677)	(-0.934)
North†	-0.097	0.038	-0.202	-0.111	0.045	-0.214*
	(-0.764)	(0.265)	(-1.493)	(-0.965)	(0.264)	(-1.801)
Centre†	0.053	0.064	0.045	0.052	0.087	0.043
	(0.785)	(0.576)	(0.592)	(0.637)	(0.697)	(0.525)
Round 3‡	-0.015	0.606	-0.160	-0.008	0.757*	-0.161
	(-0.074)	(1.375)	(-0.955)	(-0.042)	(1.875)	(-0.884)
Round 4‡	0.261***	0.245**	0.229***	0.276***	0.284**	0.237***
	(3.319)	(2.528)	(3.249)	(3.071)	(1.999)	(2.588)
Constant ‡	-1.090***	-3.544***	-0.628*	-1.163***	-4.068***	-0.665**
	(-2.900)	(-5.651)	(-1.759)	(-3.815)	(-7.098)	(-2.162)
N	1803	1803	1803	1803	1803	1803
Pseudo r2	0.031	0.076	0.031			
Clusters	39	39	39			
Chi 2	146.828	166.758	109.241	62.244	63.613	57.223
% correct predictions	66.78%	89.46%	74.38%			
rho				0.094	0.219	0.067
Likelihood-ratio test of rho=0				6.21***	15.22***	2.68*

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. Rho indicates the proportion of total variance due to within estimates. † excluded regional dummy is South; ‡ rounds 1 and 2 excluded.*

Table 7.6: Robust OLS (pooled panel). Dependent variable: Change in log per capita consumption

				Received distant remittances		Received local remittances	
	1	2	3	Yes	No	Yes	No
Sick member	0.534***	0.640***	0.640***	-0.172	0.583***	0.239	0.637***
	(4.868)	(4.707)	(4.735)	(-0.602)	(4.847)	(1.277)	(4.966)
Sick*RemLocal		-0.372**	-0.389**				
		(-2.271)	(-2.330)				
Sick*RemDistant		0.001	0.009				
		(0.006)	(0.035)				
Death	-0.071	0.188	-0.064	-1.160**	0.112	-0.008	-0.049
	(-0.265)	(0.475)	(-0.230)	(-2.138)	(0.380)	(-0.014)	(-0.144)
Death*RemLocal		-0.338					
		(-0.468)					
Death*RemDistant		-0.828					
		(-1.340)					
Flood	0.141	0.015	0.123	0.417	0.046	0.324	0.153
	(0.870)	(0.079)	(0.768)	(1.125)	(0.297)	(0.922)	(0.871)
Flood*RemLocal		0.174					
		(0.500)					
Flood*RemDistant		0.626					
		(1.579)					
Drought	-0.806***	-0.960***	-0.934***	-0.600	-1.092***	-1.995***	-0.688***
	(-3.616)	(-4.098)	(-4.071)	(-0.826)	(-5.748)	(-4.514)	(-2.767)
Drought*RemLocal		-1.078***	-1.115***				
		(-3.043)	(-3.214)				
Drought*RemDistant		1.055**	1.012*				
		(2.044)	(2.016)				
Female head	-0.008	-0.023	-0.023	-0.559	0.049	0.263	-0.140
	(-0.091)	(-0.239)	(-0.256)	(-1.681)	(0.457)	(1.086)	(-1.107)
Age	0.002	0.003	0.003	-0.058	0.011	0.023	-0.005
	(0.157)	(0.263)	(0.252)	(-1.375)	(0.768)	(0.673)	(-0.297)
Age square	0.000	-0.000	0.000	0.001*	-0.000	-0.000	0.000
	(0.124)	(-0.030)	(0.006)	(1.805)	(-0.733)	(-0.482)	(0.380)
Education (years)	0.027**	0.025*	0.025*	0.090	0.018	0.040	0.017
	(2.162)	(1.927)	(1.935)	(1.663)	(1.294)	(1.114)	(0.945)

Initial income	-0.111***	-0.113***	-0.114***	-0.388***	-0.089**	0.126	-0.196***
	(-3.375)	(-3.397)	(-3.488)	(-2.936)	(-2.461)	(1.625)	(-4.537)
Household size	-0.048***	-0.050***	-0.049***	-0.106*	-0.050***	-0.126***	-0.020
	(-3.959)	(-3.832)	(-3.747)	(-1.753)	(-2.967)	(-2.860)	(-1.125)
Married	-0.026	-0.021	-0.027	-0.566	0.112	-0.115	0.026
	(-0.234)	(-0.182)	(-0.232)	(-1.361)	(0.743)	(-0.372)	(0.188)
Member in salaried Employment	-0.097	-0.095	-0.087	-1.157***	-0.022	-0.493*	0.108
	(-0.848)	(-0.820)	(-0.751)	(-2.901)	(-0.172)	(-1.981)	(0.658)
Born abroad	0.383***	0.367***	0.369***	-0.665	0.404***	0.344	0.416**
	(3.315)	(3.083)	(3.078)	(-0.552)	(2.823)	(0.643)	(2.179)
Member accessed credit in 12 months before round 1	-0.060	-0.060	-0.061	0.449	-0.095	-0.280	0.086
	(-0.654)	(-0.615)	(-0.639)	(1.600)	(-0.818)	(-1.396)	(0.668)
Receive remittances	0.037	0.197	0.217		-0.099		0.318*
	(0.363)	(1.258)	(1.321)		(-0.773)		(1.949)
Livestock index	-0.040*	-0.047**	-0.045**	0.011	-0.061**	-0.093	-0.032
	(-2.023)	(-2.277)	(-2.185)	(0.114)	(-2.438)	(-1.575)	(-1.190)
Non-Livestock asset index	-0.006	-0.005	-0.005	0.116	-0.016	0.012	-0.014
	(-0.270)	(-0.218)	(-0.198)	(1.222)	(-0.641)	(0.168)	(-0.448)
North†	0.224**	0.213*	0.219**	-0.458	0.248**	0.182	0.225*
	(2.157)	(2.016)	(2.093)	(-1.023)	(2.138)	(0.641)	(1.901)
Centre†	0.125	0.117	0.126	-0.021	0.173	0.292	0.071
	(1.294)	(1.191)	(1.284)	(-0.076)	(1.667)	(1.420)	(0.616)
Round 3‡	0.220	0.195	0.202	3.222***	0.141	0.467	0.012
	(0.682)	(0.592)	(0.624)	(6.231)	(0.410)	(0.649)	(0.033)
Round 4‡	0.112	0.114	0.108	0.762*	0.080	0.268	0.082
	(1.010)	(1.049)	(0.989)	(2.016)	(0.723)	(1.045)	(0.633)
Constant‡	-0.133	-0.145	-0.155	1.121	-0.442	-2.041	0.641
	(-0.224)	(-0.246)	(-0.261)	(0.732)	(-0.750)	(-1.299)	(1.054)
N	1270	1270	1270	140	1130	381	889
r2	0.055	0.063	0.061	0.273	0.057	0.094	0.075
Clusters	39	39	39	36	39	39	39
F	14.771	105.925	94.277		9.099	9.326	11.313

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. † excluded regional dummy is South; ‡ rounds 1 and 2 excluded.*

Table 7.7: Predicting health shocks and excluding predictable shocks

	Probit for a household having a sick member		Robust OLS: Dependent variable: Change in log per capita consumption	
	Probit 1	Probit 2	Correct positive predictions from Probit 1 excluded	Correct positive predictions from Probit 2 excluded
Sick member			0.521***	0.595***
			(4.460)	(4.817)
Death			0.110	-0.095
			(0.311)	(-0.293)
Flood	0.324***	0.361***	0.371*	0.459*
	(2.935)	(3.765)	(1.753)	(1.999)
Drought	-0.429***	-0.479***	-0.789***	-0.807***
	(-2.631)	(-2.744)	(-3.757)	(-3.861)
Log per capita income	0.025			
	(0.985)			
Female head	-0.040	-0.041	-0.032	-0.009
	(-0.398)	(-0.602)	(-0.298)	(-0.079)
Age	0.026***		0.003	0.010
	(3.281)		(0.184)	(0.530)
Age square	-0.000***		-0.000	-0.000
	(-3.048)		(-0.001)	(-0.480)
Education (years)	-0.004	-0.009	0.029*	0.025
	(-0.312)	(-0.842)	(1.730)	(1.457)
Initial income			-0.101**	-0.098***
			(-2.594)	(-2.927)
Household size	0.029	0.028*	-0.070***	-0.070***
	(1.488)	(1.900)	(-4.259)	(-4.184)
Married	-0.083	-0.087	0.044	0.065
	(-0.636)	(-1.154)	(0.310)	(0.425)
Member in salaried employment	-0.004	0.014	0.090	0.059
	(-0.044)	(0.167)	(0.690)	(0.456)
Born abroad	-0.218*	-0.146	0.475***	0.419***
	(-1.719)	(-1.001)	(3.940)	(3.546)
Member accessed credit in 12 months before round 1	0.118	0.160*	-0.009	0.080
	(1.293)	(1.925)	(-0.085)	(0.785)
Receive remittances	0.103*	0.104*	0.038	0.064
	(1.722)	(1.849)	(0.370)	(0.651)
Livestock index	-0.007	-0.006	-0.038	-0.050*
	(-0.259)	(-0.230)	(-1.371)	(-1.902)
Non-Livestock asset index	-0.045*	-0.019	-0.002	-0.006
	(-1.733)	(-0.875)	(-0.080)	(-0.256)
North†	-0.160	-0.115	0.228**	0.186*
	(-1.278)	(-0.971)	(2.205)	(1.716)
Centre†	0.016	0.051	0.148	0.150
	(0.222)	(0.812)	(1.291)	(1.370)
Round 3‡	0.400***	0.282**	0.228	0.228
	(2.605)	(2.005)	(0.711)	(0.723)
Round 4‡	0.172**	0.174**	0.124	0.171
	(1.990)	(2.302)	(1.044)	(1.462)
Constant‡	-1.334***	-0.430***	-0.238	-0.425
	(-4.423)	(-2.752)	(-0.348)	(-0.572)
N	1877	2239	1030	1058
(Pseudo) r2	0.024	0.018	0.059	0.063
Clusters	39	39	39	39
F			15.340	18.080
Chi 2	239.184	167.193		
% correct predictions (0.5 cut-off)	58.71%	56.19%		

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*
† excluded regional dummy is South; ‡ rounds 1 and 2 excluded.

Table 7.8: Food versus non-food consumption. Dependent variable: Change in log of per capita consumption

	Food consumption		Non-food consumption		Non-food excl. health	
	1	2	3	4	5	6
Sick member	0.565***	0.609***	0.395***	0.539***	0.383**	0.485**
	(5.016)	(3.898)	(2.821)	(3.321)	(2.587)	(2.505)
Sick*RemLocal		-0.108		-0.519***		-0.321
		(-0.497)		(-3.071)		(-1.484)
Sick*RemDistant		-0.133		0.107		-0.063
		(-0.420)		(0.480)		(-0.255)
Death	0.096	0.236	-0.294	-0.380	-0.390	-0.623
	(0.283)	(0.604)	(-0.837)	(-0.721)	(-1.027)	(-1.046)
Death*RemLocal		0.154		0.521		0.475
		(0.177)		(0.895)		(0.696)
Death*RemDistant		-1.354**		-0.819		0.247
		(-2.310)		(-0.960)		(0.251)
Flood	-0.009	-0.145	0.370*	0.286	0.168	0.129
	(-0.056)	(-0.778)	(1.817)	(1.101)	(0.770)	(0.440)
Flood*RemLocal		0.173		0.167		0.123
		(0.560)		(0.440)		(0.277)
Flood*RemDistant		0.841		0.177		0.021
		(1.459)		(0.397)		(0.042)
Drought	-1.123***	-1.228**	-0.756***	-0.738***	-0.531***	-0.472**
	(-3.004)	(-2.574)	(-5.980)	(-4.334)	(-3.118)	(-2.242)
Drought*RemLocal		-1.571***		0.262		-0.122
		(-3.549)		(0.290)		(-0.133)
Drought*RemDistant		1.267*		-0.536**		-0.377
		(1.912)		(-2.227)		(-0.678)
Female head	-0.048	-0.046	0.134	0.140	0.082	0.086
	(-0.364)	(-0.335)	(1.130)	(1.154)	(0.611)	(0.633)
Age	-0.001	-0.000	-0.007	-0.009	-0.008	-0.009
	(-0.081)	(-0.012)	(-0.532)	(-0.604)	(-0.467)	(-0.509)
Age square	-0.000	-0.000	0.000	0.000	0.000	0.000
	(-0.133)	(-0.223)	(1.178)	(1.203)	(0.953)	(1.003)
Education (years)	0.026**	0.025**	0.040**	0.040**	0.024	0.023
	(2.415)	(2.287)	(2.423)	(2.359)	(1.547)	(1.532)
Initial income	-0.115***	-0.116***	-0.205***	-0.205***	-0.188***	-0.188***
	(-2.847)	(-2.812)	(-6.019)	(-6.314)	(-4.373)	(-4.376)

Household size	-0.060***	-0.061***	-0.038**	-0.039***	-0.050***	-0.050***
	(-3.809)	(-3.825)	(-2.642)	(-2.731)	(-3.744)	(-3.734)
Married	-0.078	-0.077	0.049	0.077	0.131	0.135
	(-0.619)	(-0.569)	(0.388)	(0.589)	(0.848)	(0.880)
Member in salaried employment	-0.215*	-0.226**	-0.134	-0.135	-0.054	-0.048
	(-1.967)	(-2.045)	(-0.924)	(-0.917)	(-0.354)	(-0.307)
Born abroad	0.316**	0.292**	0.348*	0.359**	0.018	0.025
	(2.488)	(2.106)	(1.928)	(2.053)	(0.118)	(0.170)
Member accessed credit in 12 months before round 1	-0.136	-0.153	-0.017	-0.001	-0.101	-0.092
	(-1.222)	(-1.322)	(-0.164)	(-0.008)	(-0.827)	(-0.738)
Receive remittances	0.013	0.054	-0.021	0.198	0.021	0.172
	(0.106)	(0.269)	(-0.249)	(1.361)	(0.224)	(0.897)
Livestock index	-0.046*	-0.053**	-0.050*	-0.054**	-0.055**	-0.055*
	(-1.894)	(-2.215)	(-1.866)	(-2.069)	(-2.091)	(-2.001)
Non-Livestock asset index	0.050	0.053	0.057**	0.057**	0.066**	0.066**
	(1.565)	(1.552)	(2.107)	(2.145)	(2.305)	(2.324)
North†	0.306***	0.306***	0.175	0.162	0.344***	0.337**
	(3.527)	(3.433)	(1.513)	(1.363)	(2.773)	(2.644)
Centre†	0.153*	0.151	0.081	0.089	0.150	0.158
	(1.752)	(1.680)	(0.720)	(0.766)	(1.392)	(1.408)
Round 3‡	0.395	0.418	0.560	0.547	0.668*	0.668*
	(1.338)	(1.374)	(1.457)	(1.419)	(1.734)	(1.707)
Round 4‡	0.092	0.101	0.273**	0.288**	0.470***	0.479***
	(0.756)	(0.828)	(2.468)	(2.518)	(3.711)	(3.628)
Constant‡	0.181	0.144	0.031	-0.024	-0.204	-0.254
	(0.317)	(0.247)	(0.045)	(-0.034)	(-0.269)	(-0.327)
N	1162	1162	1121	1121	1036	1036
r2	0.054	0.063	0.046	0.048	0.041	0.036
Clusters	39	39	39	39	39	39
F	6.078	686.144	18.377	77.116	12.337	18.437

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. † excluded regional dummy is South; ‡ rounds 1 and 2 excluded.*

Table 7.9: Fixed Effects regression. Dependent variable: Change in log of per capita consumption

			Receive Distant Remittances		Receive Local Remittances	
	1	2	Yes	No	Yes	No
Sick member	0.984***	1.146***	0.114	1.016***	1.128***	1.190***
	(6.411)	(6.833)	(0.186)	(5.937)	(2.762)	(6.419)
Sick*RemLocal		-0.550**				
		(-2.348)				
Sick*RemDistant		-0.070				
		(-0.180)				
Death	-0.292	0.207	-2.059***	-0.253	-0.718	-0.252
	(-0.970)	(0.460)	(-12.733)	(-0.685)	(-0.817)	(-0.755)
Death*RemLocal		-0.935				
		(-0.965)				
Death*RemDistant		-1.065				
		(-1.627)				
Flood	0.389	0.190	-1.231	0.047	0.949*	0.594**
	(1.389)	(0.718)	(-1.168)	(0.160)	(1.760)	(2.149)
Flood*RemLocal		-0.164				
		(-0.237)				
Flood*RemDistant		1.531**				
		(2.432)				
Drought	-0.884***	-0.975***	-1.583***	-1.223***	-1.972***	-0.620*
	(-3.926)	(-3.005)	(-2.967)	(-3.803)	(-3.41e+15)	(-1.781)
Drought*RemLocal		-1.602***				
		(-2.829)				
Drought*RemDistant		1.044**				
		(2.377)				
Receive remittances	0.046	0.325*		-0.165		0.331
	(0.324)	(1.880)		(-0.966)		(1.160)
Constant	-0.851***	-0.935***	0.130	-0.787***	-0.972***	-1.003***
	(-7.469)	(-8.074)	(0.301)	(-6.781)	(-3.751)	(-8.590)
N	1434	1434	170	1264	443	991
r2	0.070	0.088	0.210	0.075	0.095	0.104
Clusters	39	39	39	39	39	39
F	17.027	54.277	67.823	15.866	3.452	13.696
rho	0.247	0.254	0.568	0.291	0.462	0.348

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. Rho indicates the proportion of total variance due to within estimates.*

Table 7.10: Excluding the extreme poor. Dependent variable: Change in log of per capita consumption.

	Total consumption	Food consumption	Non-food consumption	Non-food excl. health
Sick member	0.303***	0.346***	0.263**	0.227*
	(3.226)	(3.235)	(2.332)	(1.795)
Death	-0.060	0.020	-0.294	-0.341
	(-0.183)	(0.066)	(-0.706)	(-0.876)
Flood	0.064	-0.043	0.292	0.195
	(0.465)	(-0.286)	(1.536)	(0.957)
Drought	-0.604***	-0.718**	-0.723***	-0.500*
	(-2.878)	(-2.555)	(-4.657)	(-1.888)
Female head	0.168	0.080	0.302**	0.157
	(1.347)	(0.446)	(2.261)	(0.921)
Age	-0.004	-0.027	0.013	0.005
	(-0.207)	(-1.527)	(0.607)	(0.174)
Age square	0.000	0.000	-0.000	0.000
	(0.612)	(1.573)	(-0.137)	(0.199)
Education (years)	0.017	0.003	0.038*	0.027
	(0.982)	(0.195)	(1.788)	(1.411)
Initial income	-0.376***	-0.326***	-0.374***	-0.322***
	(-8.255)	(-7.356)	(-7.298)	(-5.597)
Household size	0.011	0.011	0.007	-0.007
	(0.575)	(0.459)	(0.299)	(-0.288)
Married	0.108	-0.018	0.273**	0.281
	(0.801)	(-0.090)	(2.106)	(1.549)
Member in salaried employment	-0.181	-0.358***	-0.129	-0.154
	(-1.534)	(-2.745)	(-0.929)	(-0.936)
Born abroad	0.306*	0.025	0.414	0.139
	(1.741)	(0.158)	(1.680)	(0.913)
Member accessed credit in 12 months before round 1	-0.116	-0.077	-0.092	-0.109
	(-0.991)	(-0.475)	(-0.672)	(-0.791)
Receive remittances	-0.027	-0.064	-0.075	-0.088
	(-0.264)	(-0.529)	(-0.774)	(-0.844)
Livestock index	-0.027	-0.027	-0.040	-0.038
	(-0.941)	(-0.837)	(-1.237)	(-1.175)
Non-Livestock asset index	0.011	0.022	0.015	0.018
	(0.344)	(0.707)	(0.491)	(0.597)
North†	0.226*	0.167	0.247**	0.425***
	(1.955)	(1.326)	(2.304)	(4.196)
Centre†	0.199	0.023	0.190	0.196*
	(1.579)	(0.175)	(1.607)	(1.732)
Round 3‡	0.166	0.254	0.504	0.437
	(0.407)	(0.763)	(0.913)	(0.795)
Round 4‡	-0.119	-0.013	0.044	0.251*
	(-0.738)	(-0.070)	(0.351)	(1.790)
Constant‡	2.116**	2.590***	0.852	0.804
	(2.630)	(4.131)	(0.876)	(0.746)
N	927	880	841	790
r2	0.133	0.095	0.110	0.081
Clusters	39	39	39	39
F	43.526	11.866	51.822	16.379

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*
† excluded regional dummy is South; ‡ rounds 1 and 2 excluded.

Table 7.11: Impact of sickness of different household members. Dependent variable: Change in log of per capita consumption

	Food consumption	Non-food consumption	Non-food excl. health
Sick adult female	-0.009	-0.172	-0.197
	(-0.068)	(-1.205)	(-1.206)
Sick adult male	0.366***	0.266**	0.171
	(3.270)	(2.386)	(1.450)
Sick girl	0.443***	0.492***	0.614***
	(3.589)	(3.383)	(4.196)
Sick boy	0.489***	0.298**	0.305**
	(3.859)	(2.612)	(2.222)
Flood	0.005	0.383*	0.202
	(0.030)	(1.915)	(0.942)
Drought	-1.034***	-0.680***	-0.433**
	(-2.792)	(-4.758)	(-2.156)
Female head	-0.023	0.164	0.121
	(-0.180)	(1.409)	(0.878)
Age	0.005	-0.001	0.001
	(0.315)	(-0.086)	(0.055)
Age square	-0.000	0.000	0.000
	(-0.433)	(0.806)	(0.506)
Education (years)	0.024**	0.038**	0.021
	(2.286)	(2.178)	(1.310)
Initial income	-0.122***	-0.201***	-0.187***
	(-3.119)	(-6.247)	(-4.576)
Household size	-0.068***	-0.048***	-0.064***
	(-3.724)	(-2.985)	(-4.092)
Married	-0.099	0.001	0.080
	(-0.802)	(0.011)	(0.482)
Member in salaried employment	-0.194*	-0.117	-0.030
	(-1.802)	(-0.849)	(-0.207)
Born abroad	0.291**	0.328*	0.018
	(2.071)	(1.864)	(0.124)
Member accessed credit in 12 months before round 1	-0.131	-0.007	-0.075
	(-1.207)	(-0.070)	(-0.605)
Receive remittances	0.022	-0.020	0.017
	(0.176)	(-0.247)	(0.192)
Livestock index	-0.035	-0.041	-0.044
	(-1.556)	(-1.462)	(-1.556)
Non-Livestock asset index	0.053	0.057*	0.063**
	(1.587)	(1.964)	(2.079)
North†	0.259***	0.130	0.296**
	(3.118)	(1.164)	(2.508)
Centre†	0.090	0.032	0.097
	(1.022)	(0.302)	(0.951)
Round 3‡	0.396	0.570	0.674*
	(1.309)	(1.453)	(1.703)
Round 4‡	0.051	0.251**	0.454***
	(0.429)	(2.324)	(3.663)
Constant‡	0.265	0.056	-0.231
	(0.455)	(0.083)	(-0.311)
N	1162	1121	1036
r2	0.063	0.076	0.076
Clusters	39	39	39
F	10.597	20.820	25.788

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.*
† excluded regional dummy is South; ‡ rounds 1 and 2 excluded.

Table 7.12: Health shocks in male and female headed households. Dependent variable: Change in log of per capita consumption

	Food consumption		Non-food consumption		Non-food excl. health	
	Female head	Male head	Female head	Male head	Female head	Male head
Sick adult female	0.624**	-0.252	0.213	-0.325*	0.123	-0.317
	(2.304)	(-1.570)	(0.941)	(-1.874)	(0.433)	(-1.644)
Sick adult male	0.392	0.371***	0.347	0.276**	0.046	0.203
	(1.125)	(2.871)	(1.206)	(2.321)	(0.169)	(1.433)
Sick girl	0.330	0.469***	0.603**	0.503***	0.708*	0.639***
	(0.971)	(3.363)	(2.283)	(2.964)	(1.961)	(3.440)
Sick boy	0.364	0.537***	0.212	0.308**	0.008	0.339**
	(1.055)	(4.121)	(0.825)	(2.671)	(0.026)	(2.380)
Flood	-0.225	0.093	0.453	0.390*	-0.152	0.315
	(-0.726)	(0.612)	(1.223)	(1.771)	(-0.353)	(1.475)
Drought	-0.439	-1.272***	-0.878	-0.592***	-0.506	-0.351
	(-0.516)	(-3.321)	(-1.198)	(-2.744)	(-0.446)	(-1.417)
Age	-0.012	0.008	0.014	-0.006	0.016	-0.005
	(-0.448)	(0.406)	(0.794)	(-0.354)	(0.623)	(-0.278)
Age square	-0.000	-0.000	-0.000	0.000	-0.000	0.000
	(-0.019)	(-0.415)	(-0.423)	(0.950)	(-0.298)	(0.753)
Education (years)	0.035	0.024*	0.054**	0.042**	0.018	0.027
	(1.214)	(1.885)	(2.350)	(2.025)	(0.624)	(1.364)
Initial income	-0.184**	-0.103**	-0.330***	-0.160***	-0.242***	-0.160***
	(-2.296)	(-2.335)	(-4.431)	(-4.061)	(-3.426)	(-3.410)
Household size	-0.129***	-0.043*	-0.072**	-0.034	-0.080**	-0.042**
	(-3.208)	(-1.757)	(-2.288)	(-1.637)	(-2.136)	(-2.123)
Married	-0.207	0.184	0.004	0.189	0.175	0.092
	(-1.220)	(0.785)	(0.025)	(0.958)	(0.913)	(0.406)
Member in salaried employment	-0.383	-0.152	-0.069	-0.115	0.424	-0.106
	(-1.132)	(-1.269)	(-0.183)	(-0.718)	(1.542)	(-0.664)
Born abroad	0.548	0.207	0.073	0.261	-0.238	0.017
	(1.456)	(1.350)	(0.215)	(1.204)	(-0.595)	(0.100)
Member accessed credit in 12 months before round 1	-0.296	-0.113	-0.353	0.101	-0.601**	0.049
	(-1.363)	(-0.909)	(-1.510)	(0.872)	(-2.382)	(0.373)
Receive remittances	0.273	-0.075	0.357	-0.158	0.369	-0.105
	(1.069)	(-0.559)	(1.586)	(-1.586)	(1.593)	(-0.904)
Livestock index	-0.061	-0.033	-0.226**	-0.010	-0.196**	-0.015
	(-1.130)	(-1.214)	(-2.713)	(-0.338)	(-2.150)	(-0.592)
Non-Livestock asset index	0.144***	0.043	0.187**	0.031	0.082	0.058
	(3.141)	(1.048)	(2.726)	(0.866)	(0.844)	(1.590)
North	-0.061	0.286**	0.628**	-0.018	0.542*	0.238*
	(-0.537)	(2.536)	(2.272)	(-0.125)	(1.889)	(1.791)
Centre	0.140	0.076	0.095	-0.007	0.181	0.073
	(0.889)	(0.717)	(0.564)	(-0.064)	(0.889)	(0.738)
Round 3	-0.409	0.657*	0.112	0.709	0.851	0.662
	(-1.078)	(1.698)	(0.190)	(1.507)	(1.668)	(1.254)
Round 4	0.104	0.036	0.100	0.319**	0.159	0.490***
	(0.471)	(0.271)	(0.505)	(2.250)	(0.691)	(3.222)
Constant	2.129**	-0.554	1.058	-0.492	-0.170	-0.403
	(2.424)	(-0.749)	(1.146)	(-0.620)	(-0.177)	(-0.435)
N	268	894	257	865	233	803
r2	0.113	0.073	0.162	0.073	0.152	0.076
Clusters	32	39	32	39	32	39
F	20.107	10.526	13.507	9.799	8.057	11.719

*Notes: t-values in parenthesis, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. † excluded regional dummy is South; ‡ rounds 1 and 2 excluded.*

Table 7.13: The Persistence of Shocks. Dependent Variable: Log Per Capita Consumption

	1st stage	IV
Sick Member Dummy		-0.628*
		(-1.710)
Lag Sick Member	0.100***	0.006
	(0.027)	(0.112)
Death Dummy	0.081	0.144
	(0.075)	(1.568)
Lag Death	-0.143**	-0.026
	(0.067)	(-0.233)
Flood Dummy	0.043	0.063
	(0.045)	(0.868)
Lag Flood	0.148	0.251**
	(0.051)***	(2.404)
Drought	-0.134	-0.244*
	(0.088)	(-1.801)
Lag Drought	0.098	-0.086
	(0.085)	(-1.037)
Log Per Capita Income	0.032***	0.726***
	(0.010)	(27.593)
Female Head Dummy	-0.017	-0.167**
	(0.042)	(-2.402)
Age	0.006	0.016**
	(0.005)	(2.188)
Age Squared	-0.000	-0.000**
	(0.000)	(-2.448)
Education (Years)	-0.001	0.019***
	(0.005)	(2.631)
Household Size	0.017**	-0.040***
	(0.007)	(-3.491)
Head Married Dummy	-0.019	-0.039
	(0.049)	(-0.543)
Member in Salaried Employment	0.008	-0.088
	(0.044)	(-1.149)
Born Abroad	-0.066	0.052
	(0.060)	(0.643)
Member Accessed Credit in 12 Months before Round 1	0.051	0.194*
	(0.040)	(1.925)
Receive Remittances	0.069**	0.139***
	(0.029)	(3.380)
Livestock Index	-0.002	-0.017
	(0.011)	(-0.949)
Non-Livestock Asset Index	-0.016*	0.041**
	(0.010)	(2.401)
Lagged per capita income	-0.051***	
	(0.008)	
Members over 55 years	0.043	
	-0.18	
Regional Dummies	Yes	Yes
Round Dummies	Yes	Yes
Constant	0.043	0.644**
	(0.180)	(2.291)
N	1212	1212
r2	0.112	0.644
F	5.72	300.256
Hanson J P-value (overidentification test)		0.4946
Kleibergen-Paap P-value (underidentification test)		0.0000

*Notes: t-values in parentheses, *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. Sick Member instrumented using lag of per capita income and number of household members over the age of 55 years. † excluded regional dummy is South; ‡ rounds 1 and 2 excluded. First stage dependent variable is 'Sick member'.*

8 SUMMARY AND CONCLUSIONS

8.1 SUMMARY OF RESEARCH

By studying remittances in rural Malawi, this thesis has aimed to contribute to the understanding of transfers in a developing context from several perspectives. Based on relevant literature, it has used three different data sets to "follow" remittances from the sender by answering the question, "what motivates people to send remittances?", to the receiver by contributing to understanding how s/he views remittance receipts, and how they are spent, and finally to one of their impacts, by assessing whether remittances are able to moderate the impact of negative household and community shocks.

Chapter 1 summarises the remittances literature in an international context before focusing on the microeconomic impacts on which this thesis is centred. The same chapter goes on to discuss the Malawian context, examining the major themes relevant to the country without which any study of Malawi would be incomplete. It finally shows why Malawi is a useful context for the analysis of remittances on a microeconomic level.

Chapter 2 provides a literature review which moves the thesis from the general topics of remittances and the context to the more specific areas on which the empirical chapters focus. It begins by giving a summary of the theory of remittances before going on to discuss in detail the literature on motivations for remitting; mental accounting and its relevance for remittances; and the impact of household and community shocks on household consumption.

Chapter 3 gives descriptive statistics for the three data sets used in the empirical chapters. All are Malawian and all contain information which are specifically relevant for the chapter they are used for. Chapter 4 looks at the empirical methodologies used, and gives reasons for the methods used.

Chapters 5 to 7 are the three empirical chapters, which each focus on a different area of remittances. Chapter 5 uses data on inter-family transfers to help understand the motivations for remitting. Chapter 6 draws heavily on economic psychology theory to understand how remittance receivers view and use this money, with a focus on

remittance uses. Chapter 7 contributes to the understanding of one of the potential impacts of remittances; whether they are able to moderate the impact of negative shocks (death, sickness, flooding, drought). This chapter summarises and concludes.

8.1.1 Non-empirical findings

Chapter 1 places this thesis into its context both with regards to remittances, and the country studied, Malawi. It shows that international remittance flows have been growing in importance over the previous 20 years, and are now greater in value than both Overseas Development Aid, and Foreign Direct Investment. International remittance flows are however, just one part of the story, with internal transfers being of considerable importance for rural households in developing countries. In Malawi, over 20 per cent of households receive remittances, and these come from the home village, more distant rural areas, cities within Malawi and sub-Saharan Africa, and from further afield including Europe and North America. In Malawi, official foreign remittances make up around one per cent of GDP, although if Malawi is a typical sub-Saharan African country, this might be around two per cent if non official flows are included. Although this is small compared to some other countries in the region, the importance of internal transfers in addition to international flows mean that remittances are an important source of income for many rural households. In addition to the different geographical sources, remittances might be received from neighbours and friends as well as from (close and distant) relatives.

Studying the impact of remittances is a challenging task due to data limitations, and the impact of social and cultural factors and context which differ widely between, and even within, countries. In particular, the motivations for remitting may differ, which will imply different uses of remittances, and different impacts at both household and the macro levels. Remittances may be used to fund current consumption, or invested in land potentially creating negative macroeconomic consequences, or may deter labour market participation. Equally, remittances tend to reduce poverty (but perhaps increase inequality), and can help to fund investment in productive private enterprise and social amenities. The overall impact of remittances is not therefore, immediately apparent, but varies depending upon the context.

The importance of remittances to rural Malawian households make this country an ideal setting for this thesis. In addition, the risk and impact of HIV/AIDS, and the risky agricultural economy mean that many households frequently have to rely on transfers in

order to smooth their consumption through shocks. This allows this thesis to test for the moderating impact of remittances following (health and climactic) shocks, and permits a wide range of possible motivations for remitting to be tested (altruism, which reacts to wealth; altruism or insurance following a health shock; services provided such as looking after AIDS orphans; inheritance under different mixtures of matrilineal and patrilineal systems used by different tribes in Malawi).

Chapter 2 begins by summarising the main models of remittances. These highlight the difficulties in separating motivations for remitting, particularly with regards to altruism and insurance models, with many of the signs of coefficients expected to be the same under each motivation. Nonetheless, the models do help to draw out certain testable conclusions upon which the discriminating hypotheses for remittance motivations are based. For example, under altruism the sender will send more as his/her own income rises, and as the receiver's income declines. Under the insurance model, transfers are increasing as the probability of the sender suffering from a shock increases.

Chapter 2 goes on to discuss empirical findings from papers which aim to understand the motivations for remitting. The fact that no paper has, to date, been able to single out one motivation is indicative of the fact that different remitters have different motivations in each context studied. In addition, one remitter can have more than one motivation since the existence of one reason for remitting does not preclude another; for example, a threat of disinheritance may help to enforce an insurance payout from the child if the parent is sick. In this case, it is not clear whether the remittance is motivated by inheritance or insurance.

Nonetheless, the methodologies help to inform the empirical study in this thesis and the results are of interest. As in Chapter 5, many authors find that altruism plays an important role in motivating remittances. However, securing inheritance rights, insuring oneself against negative shocks, paying indemnities, implicit payment for services or previous loans and investment are also shown to be key motivators by various empirical studies.

After reviewing the literature on motivations to remit, Chapter 2 discusses the psychological and consumption theory related to uses of income from different sources, noting both the theoretical background and the key empirical findings. In particular, the

theory and the evidence suggest that “a dollar is not a dollar”, or rather, “a kwacha is not a kwacha”. That is, income from one source is not used in the same way as income from a different source or, put another way, even equally liquid income is not fungible.

Remittances are an ideal candidate for studying this theory in a developing context. There are several reasons to suspect that remittances might be used differently to income from other sources. For example, they may come with conditions attached (“use this money to educate my little brother”), or may be a form of income pooling in order to reduce risk, and potentially alter consumption behaviour. In addition, remittances may be seen as “manna from heaven” and wasted, or as the product of someone else’s hard work and come with a duty to use them “wisely”. These ideas are tested, in a developing context, for the first time, in Chapter 6.

Finally Chapter 2 shows the models used to estimate the impact of shocks on consumption before noting the empirical results found by other authors in a developing context. Health and weather are the main shocks analysed, and, unsurprisingly, results are mixed with some studies finding that some shocks are fully insured and other finding that consumption is sensitive to the shocks. Although the method of insurance is rarely discussed, several studies have noted that remittances could play a role.

Chapter 3 explores the three different data sets used in each of the three empirical chapters. Since each data set contains unique information which can be used to inform the overall study, the discussion of each set focuses on a different, relevant aspect of remittances and the rural Malawian household.

The FTP provides an insight into intra-family (but inter-household) remittance transfers, and notes the importance of the different relationships (parents, children, siblings) for the central households. The IHS98 helps to illustrate the difference between male and female headed households. For example, female headed households tend to be smaller, but have slightly higher income in adult equivalent terms. The CPS shows the differences between remittance receivers and non receivers, and remittance senders and non senders. In particular, senders and receivers exhibit similar characteristics to each other and are different from the wider population. For example sender and receiver households tend to be better educated, and are better connected through networks.

Chapter 4 discusses the empirical methodologies used. These include Ordinary Least Squares, Tobit models, probit models, and panel data analysis. Special attention is paid to discussing adjustments or corrections made for the purposes of the analyses in this thesis.

8.1.2 Empirical findings

Chapter 5 uses standard methodology to study motivations to remit from the perspective of intra-family transfers. Unlike most studies, the data make it possible to analyse motivations from both perspectives in the relationship. In addition, this study compares and contrasts motivations to remit between senders and receivers of different relationships, and is the first study to be able to do so.

The study uses econometric techniques widely employed in the relevant literature to model remittances sent or received as a function of sender and receiver characteristics. Expected signs of coefficients on each of the relevant variables under different motivations are clearly presented for each relationship

The results show that there is a negative relationship between net remittances received from parents, and the respondent's wealth. In addition, remittances to parents are increasing in respondent's wealth. These results are indicative of altruism on behalf of both the respondents and their parents towards each other.

Respondents and their parents tend to remit more to each other the worse the other's health is. In addition, parents are more likely to remit to respondents who have recently suffered from a health shock. These results are likely to capture some degree of altruism, and some degree of (co-)insurance amongst the respondents and their parents.

Co-insurance, as well as other more social motivations for giving, including Platteau's (1997) "balanced reciprocity" as mutual insurance is captured by the fact that respondents are more likely to receive remittances if they also give them, and are more likely to give if they also receive.

Results indicate (unsurprisingly) that motivations for remittance relationships between respondents and their children differ from those of respondents and their parents. In

particular, children appear not to respond to the respondents' remittances, and do not "insure" respondents' health shocks. Rather, children appear to desire to insure themselves with the respondents (their parents). Children remit more to the respondents, the better the insurer the respondent would make. Thus, respondents with better education and those in better health receive more from their children than others. In addition, children in better health (and thus less likely to require insurance) are less likely to send remittances. Thus the insurance is rather one-way (rather than mutual, or co-insurance), with children seeking to pay insurance premiums to the respondents, but not insuring the respondent in their turn.

There is also evidence that children remit for other reasons. For example, net receipts from children are decreasing in respondents' income indicating some degree of altruism. In addition, any one child is less likely to remit the more children there are. Agarwal and Horowitz (2002) suggest that this is also consistent with altruism. However, the results in this thesis suggest that the more children there are actually remitting, the more likely any one of these is to remit. This is potentially indicative of competition for inheritance amongst the children.

A relevant extension separates the analysis by studying child-respondent remittances separately depending upon whether they are son to father; son to mother; daughter to father; or daughter to mother, and by allowing the coefficient on wealth of the respondent to differ by inheritance system (patrilineal, matrilineal, mixed) of the tribal origins of the household. The results suggest that sons remit more to the main controller of household wealth (the female/mother in matrilineal tribes, and the male/father in patrilineal tribes) as the respondent is poorer. This is consistent with altruism or indicative of fulfilling a social responsibility. However, sons remit more to the parent who does not control wealth the wealthier that parent is. This potentially indicates that the father's wealth in a matrilineal system, and the mother's wealth in a patrilineal system is available to any child, even those who would not traditionally benefit from inheritance. Remittances to this parent would then be seen as a means of attempting to access this inheritance.

Finally, respondents and their siblings behave overwhelmingly altruistically towards each other. They remit more to each other the worse the other's health is, and siblings are

more likely to remit if the respondent has suffered from a health shock. In addition, there is a great deal of reciprocity between respondents and their siblings.

Chapter 6 follows remittance from the motivations for sending to how the receiver uses the remittances. It is based on economic psychology theory which suggests that income from different sources (even if they are equally liquid) can be viewed and used differently by the receiver.

This chapter begins by extending existing theory sketched in Chapter 2, and uses Tobit models to estimate consumption functions. The empirical section first estimates marginal propensities to consume out of different sources of (equally liquid) income each entered separately. Under traditional theory, these should be equal whilst under the behavioural mental accounting model, these are likely to differ as income from each source is placed in separate "mental accounts", and used for different purposes. In order to minimise the impact of intra-household bargaining which is an unobserved influence on consumption behaviour, male and female headed households are analysed separately throughout Chapter 6.

The results are supportive of mental accounting with remittance income exhibiting significantly lower marginal propensities to consume than salary and farm income for both male and female headed households. Interestingly, the null hypothesis that farming and salary income have the same coefficients cannot be rejected suggesting that remittance income is indeed unique.

After presenting evidence for mental accounting and showing that remittance income differs from other sources of income, Chapter 6 goes on to study remittance uses, by estimating consumption functions for each of seven categories of good. Male and female headed households are shown to differ in their use of income, but concur on one important point: remittances are used to fund education.

This result in not a surprise for rural Malawi where parents often fund the education of the eldest children who, in turn, fund the education of their younger siblings, perhaps through remittances. Cox Edwards and Ureta (2003) also find a positive association between remittance receipts and education.

Finally, the chapter asks whether there exist any consumption differences between remittance receivers and non receivers. Although, with regards to education, there is little difference between the two groups for male headed households, for female headed households, receivers exhibit a MPC education around seven times that of their non receiving counterparts. In addition, credit is an important means of funding education for non receiving female headed households, but receivers do not appear to require to borrow to fund education, but rather, are able to use the remittances.

In Chapter 7, the final empirical chapter, one of the potential impacts of remittances is studied using short panel data. Using established theory, the impacts of four shocks (sickness, death, flooding, drought) firstly on likelihood of receiving remittances, and then on consumption change are estimated. This chapter contains two major extensions to existing work. Firstly, remittances are separated by geographical source (local, defined as the recipient's village or district, and distant, defined as outside of the home district, Malawian cities, or abroad). Secondly, the chapter contributes to understanding whether remittances are able to moderate the impact of these shocks, and whether the geographical source of the remittances matter.

The results reveal that households which have suffered from a recent sickness are more likely to receive remittances than other households. The evidence suggests that health shocks are insured close to home, rather than further afield.

Climatic shocks however exhibit the opposite pattern. Having suffered from a recent flood or drought decreases the likelihood of receiving remittances from local sources, but increases the likelihood of receiving remittances from more distant sources. These results are unsurprising, but a first in the literature. Since climatic shocks impact most households in the regions which suffered, households are unable to send remittances to neighbours. Instead, in order to "insure" these shocks, remittances are required from areas which did not suffer from the shock.

Secondly, Chapter 7 asks whether remittances insure consumption. The models first estimate the impact of shocks on change in log consumption, as is standard in the literature. After addressing several important econometric issues, the results indicate that

drought has a strong negative impact on consumption growth. Death and flooding do not have a significant impact, and potential reasons for this are discussed. Somewhat surprisingly, health shocks however have a positive impact on consumption growth.

Given this result, the chapter ensures that the results are robust to a number of changes in specification, before “drilling down” into health shocks. It is ensured that results to not change substantially when using fixed effects, when excluding the extreme poor, when excluding observations for which health shocks may be predictable, and the chapter follows several other studies in examining food and non food consumption separately. Results do not differ when these changes are made.

The data provide information on which household member actually suffered from the sickness, allowing the study to separate the impact of sickness by household member. The results indicate that in male headed households, sick children and sick adult males benefit from increased food and health consumption, whilst sick females do not. In female headed households however, the reverse it true and children and adult females who have suffered from a health shock benefit from increased consumption during sickness. These findings go some way to explaining why health shocks increase consumption growth, but do not explain exactly how this is financed.

An extension asks whether shocks can have a persistent impact on consumption. Based on Dercon et al. (2005) the study estimates per capita consumption at time t as a function of shocks suffered at time t and t-1 plus control variables. Since current consumption might also impact on current health, this last variable is instrumented. Recent sickness and drought are shown to have a negative impact on current consumption level, but coefficients on lagged sickness and drought are insignificant suggesting that households are able to insulate themselves from the longer run impact of these shocks.

Neither present nor lagged death are significant. Contemporary flooding is insignificant but the lag is positive and significant. This is likely to be due to the fact that whilst some households (at the centre) suffer from flooding, many others (at the periphery) benefit over time from the increased rainfall.

8.1.3 Limitations of the study

Although this study has made every effort to make results as reliable as possible, a number of weaknesses remain, both with the generalisability of the results and with the data themselves.

Chapter 1 discusses the similarities between Malawi and her neighbours – Zambia, Tanzania and Mozambique. Although these neighbours have many things in common, including certain remittance characteristics, the extent to which the results are generalisable both to these countries and others in the region can be debated. For example, Zambia has a similar population to Malawi, but has a land area of around 740,742 square kilometres, compared with Malawi's 94,080 square kilometres. This alone, is likely to make the transporting of remittances an even greater issue in Zambia than in Malawi – perhaps making certain results here too weak for the Zambian context. The land area of Tanzania is slightly larger than that of Zambia, but with a population of 40 million and a greater mix of tribal and religious affiliations than Malawi.

The proximity of southern Mozambique to South Africa – the regional economic power – means that results found in this study are likely to be more applicable to the north of Mozambique than the south, with the south having greater access to both the labour and goods market in South Africa.

In addition, historical factors are likely to strongly influence national behaviour – large parts of Mozambique were under Portuguese control for around five centuries, whilst Zambia and Malawi were the British colonies of Northern Rhodesia and Nyasaland respectively, and came under heavy British influence for only around 100 years prior to independence. Tanzania was a German colony (German East Africa) which was transferred to the British after World War I, and has had nearly a millennium of Arab influence in coastal areas.

These basic differences, even amongst Malawi's neighbours are multiplied when we consider other countries in the region; the colonial history of the Congo under the Belgians is considerably more brutal than those of other regional countries, for example, and this large country contains many areas which are more difficult to access that remote areas in other countries in the region. South Africa has experience apartheid, and is also

the industrial economic superpower of the region whilst Botswana's economy is based on diamond mining, and has grown to become Africa's richest economy. Both Angola and Mozambique have suffered from long periods of civil war – Angola's at least partly fuelled by oil. Zimbabwe – once the 'bread-basket of Africa' has also suffered from white minority rule from 1965 to 1980, before, from the late 1990s, suffering under Mugabe's poor social, political and economic management of the country.

These differences have an impact on the relative importance of different survival mechanism, and the ease with which they can be used. Although countries in the region, and particularly Malawi's neighbours, have many things in common, the differences mean that results presented in this study should be taken as indicative of behaviour elsewhere in the region.

Although efforts have been made to ensure that the results are as reliable as possible, there remain several issues. In both chapters 5 and 6, which use cross-sectional data, it would have been ideal to use suitable panel data sets. This would help to minimise the risk that unobserved heterogeneity of individuals or households drives the results. This would be of particular interest for mental accounting, since it would be ideal to know that an individual changes his/her behaviour when his/her income composition changes, rather than simply that individuals with different income compositions have different consumption habits.

In Chapter 5, ideally, one would want to know about remittances from non-relatives and from relatives other than those the respondent was questioned about. This would make it possible to understand better the degree of substitutability of remittances from different sources. In addition, suitable instruments would be found for variables indicating receipt of remittances from different sources in order to limit the risk of simultaneity.

Since both geographical (in Chapter 7) and relationship source are shown to matter, it would be ideal to combine these findings to assess in more detail which drives remittance behaviour and how these interact.

In addition, the difficulties of household versus individual receipts would ideally be assessed using panel data. In one sense, it would be ideal to conduct analysis (of mental

accounting and motivations to remit) on an individual level since in both cases theories relate to individual motivation or behaviour. However, one cannot rule out intra-household bargaining. Therefore, the household level would be more suitable. Unfortunately, combining these two facts in quantitative empirical analysis is difficult, and, with the data used, almost impossible without some loss of information. Ideally, the results would therefore be combine with more qualitative analysis in order to gain a wider understanding of the results and the interaction between individual and household behaviour.

8.2 CONCLUDING REMARKS

Despite the increase in the importance of remittances, and the ever growing interest shown by academics and policy makers, remittances remain an under-studied topic relevant to their significance in a development context. Data and econometric issues make analysing remittances a difficult task, and the wide range of cultural and economic contexts ensures that the impacts of remittances can differ widely.

Despite these difficulties, this thesis has studied remittances from three relevant perspectives within the cultural setting of a rural sub-Saharan African economy. Remittances have been followed from the sender, to their uses, and finally to one of the impacts using three different, relevant data sets.

This thesis has contributed to the overall understanding of remittances. Specifically, it has extended the study of remittance motivations by looking at inter family transfers and understanding that the relationship between the sender and receiver matters. It has extended the study of mental accounting to a developing context and to remittances. This offers an explanation for other authors' findings that remittances can impact on consumption choice including education. Finally, since remittances can act to moderate the impact of shocks, this study recognises that, in an agricultural context, the geographical source of remittances matters. Community or covariate shocks require remittances from further afield than idiosyncratic, household shocks.

Although the data present some limitations, there is scope for further study of remittances from each of the angles presented. In Chapter 5, motivations for remitting could be examined from the household perspective by limiting the study to two-parent

households and including characteristics of both the husband and wife. A second extension might be to limit the study only to those households which reported having a potential remittance relationship with individuals living outside the respondents' villages. Both of these studies might produce interesting results, particularly in order to compare with the results presented in this thesis, but would also potentially suffer from selection bias. An interesting extension to Chapter 6 would be to examine remittances separately depending upon which member of the household received them. In particular, it might be useful to classify remittances separately depending upon whether they were received by the main male or main female of the household. This degree of disaggregation is likely to require a larger data set. Finally, several extensions to Chapter 7 might be insightful and provide additional, complementary, information. For example, it would be interesting to study other coping mechanisms which the household reported. With regards to remittances, as well as the geographical source, Chapter 5 suggests that the relationship of the sender to the receiver might matter. It would be interesting to know who insures the shocks, with results in Chapter 5 suggesting that parents and siblings are of great help to working age adults in this respect.

Although this thesis has offered several new perspectives from which to consider remittances, and generated new results, these potential extensions show that there are several avenues of research which remain to be pursued in each area. It is hoped that future research will provide answers to these, and other, related issues.

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